SR 101 Corridor Improvement Feasibility/NEPA Study

draft final report

prepared for

Indiana Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

Bernardin, Lochmueller & Associates, Inc.
Dyer Environmental Services

December 2002

prepared for

Indiana Department of Transportation

December 2002

draft final report

SR 101 Corridor Improvement Feasibility/NEPA Study

prepared by

Cambridge Systematics, Inc.
150 CambridgePark Drive, Suite 4000
Cambridge, Massachusetts 02140

Table of Contents

Table of Contents
(continued)

List of Tables

List of Tables
(continued)

List of Figures

List of Figures
(continued)

1.0 Overview and Executive Summary

1.1 Study Overview

The SR 101 Corridor Improvement Feasibility/NEPA Study was undertaken by the Indiana Department of Transportation to assess the implications of limited north-south access in the SR 101 study area and to identify feasible improvement alternatives. The study was conducted under Indiana's Streamlined EIS Procedures (July 6, 2001) in accordance with the National Environmental Policy Act (NEPA).

Indiana State Route 101 (SR 101) is a rural two-lane roadway that runs north-south in disconnected segments along the eastern border of Indiana, from Dekalb County in northern Indiana to Switzerland County in the south, approximately the entire length of the state. Because of its lack of continuity, its ability to effectively serve north-south vehicular movement in eastern Indiana is limited. This is a particular problem affecting accessibility for counties located in the southeastern part of the state, south of I-74.[1] These counties include Dearborn, Ohio, Switzerland, Ripley, and Jefferson.

Figure 1.1 shows the SR 101 corridor study area and its major roadways. Within this area, SR 101 runs for approximately 17 miles between I-74 in the north to U.S. 50 in the south. From this southern terminus, there is an approximate 25-mile gap in the roadway to a short segment of SR 101 over the Markland Dam Bridge on the Ohio River between Indiana and Kentucky. A new roadway, currently under construction in Kentucky, will provide a direct connection from the Markland Dam to I-71 which runs east-west, south of the study area.

Due to its largely rural character and low-density of development, traffic congestion, and roadway capacity, historically, have not been a significant concern in the SR 101 corridor. However, north-south travel through the area must rely on circuitous, winding two-lane roadways. The area's hilly terrain further impedes travel, creating difficult driving conditions in poor

[1] North of I-74, north-south movement is facilitated by SR 1 from Angola to Lawrenceburg and I-69 from the Michigan border to Indianapolis.

weather and slow response to emergencies. It is apparent that these conditions may be contributing to a higher than average rate of traffic accidents on local roadways and added travel delay and inconvenience, particularly for commercial vehicle operations. This overall lack of accessibility and connectivity to the major metropolitan areas of Indianapolis, Cincinnati, and Louisville may also be an impediment to the region's economic growth and development.

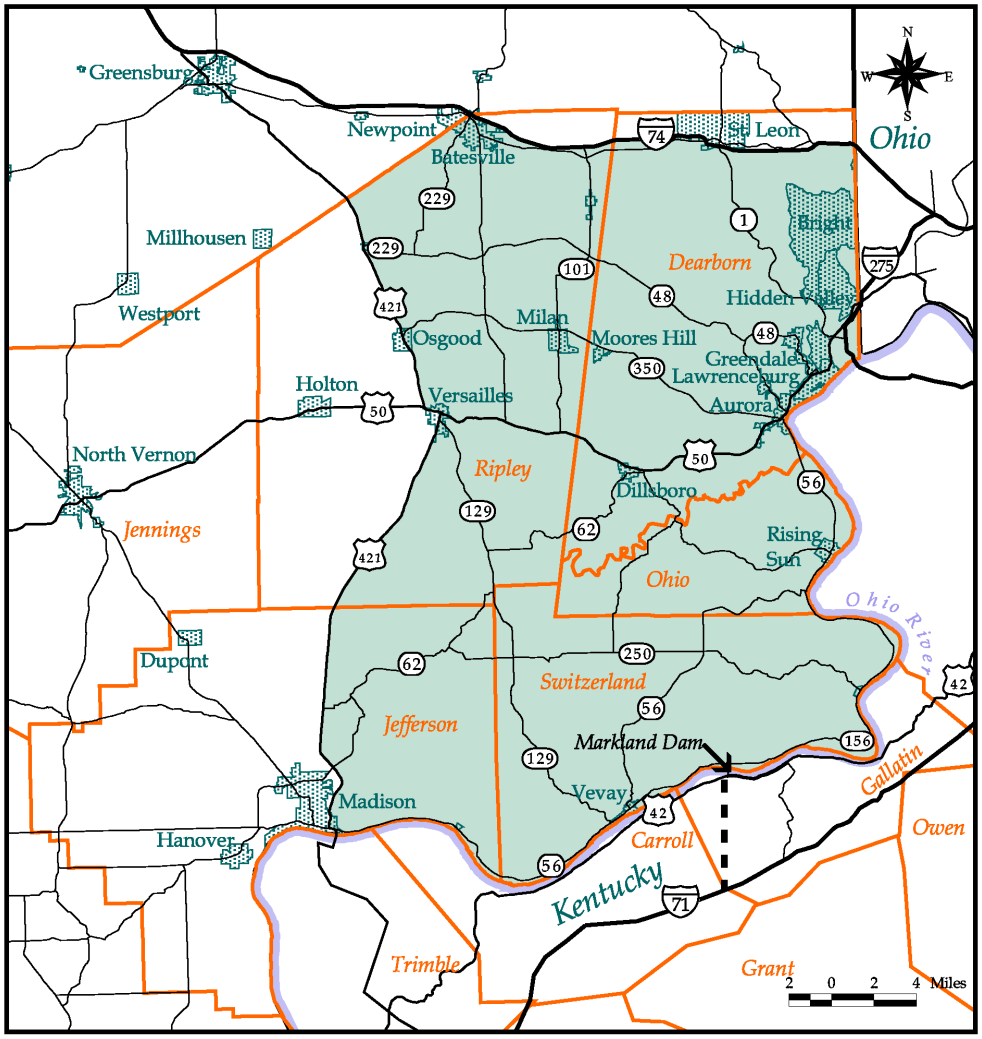
1.2 Study Area Roadways

As shown in Figure 1.1, the study area is located in southeastern Indiana and includes all of Ohio and Switzerland Counties, all of Dearborn County south of Interstate 74, and Ripley and Jefferson Counties east of U.S. 421. Overall, about 90 percent of the roadways in the study area have two lanes. Conditions on a two-lane roadway (one lane each direction) can prevent opportunities to pass other vehicles and maintain a constant travel speed. The remaining 10 percent of area roadways have four travel lanes. These roadways include I-74 and U.S. 50 between SR 101 and Lawrenceburg. In Madison, U.S. 421 also has four lanes. A short six-lane section of U.S. 50 exists in Lawrenceburg near the I-275 connector.

Another indicator of roadway operating quality is the number of curves per mile. More than one curve per mile with severe operating speed restrictions may be cause for concern, as drivers experience a more difficult time controlling their speed and maneuvering safely on the roadway. In part, due to the particularly hilly terrain of southeastern Indiana, three routes in the study area exhibit a rate of one curve/mile or higher over an extended stretch of the route. SR 129 in Switzerland County between SR 56 in Vevay and SR 250, has over one curve per mile over a 15-mile stretch of roadway. This section of roadway was identified in the 1990 SR 101 Corridor Study for reconstruction to eliminate many of the curves, thus improving mobility along this corridor. SR 62 between Dillsboro and SR 129 has over 1.5 curves per mile over a 16-mile stretch. There are sharp curves along this section and trucks reportedly avoid using this roadway.

Analysis of 1998 daily traffic volumes on the major roadways indicates that about 90 percent of the roadway miles in the study area carry less than 10,000 vehicles per day (vpd). The highest daily volumes, greater than 25,000 vpd, are along sections of I-74 at the northern boundary of the study area and I-275 east of Lawrenceburg near the Ohio and Kentucky state borders. These sections represent two percent of the study area roadways and, because they are located at or near the study area boundaries, are not a major influence on the travel patterns within the core of the study area.

Figure 1.1 SR 101 Study Area



The volume-to-capacity (v/c) ratio compares the actual volume to maximum volume (capacity) that could pass a point over time. The more congested the roadway, the closer the v/c ratio is to 1.0. About 95 percent of the roadway miles within the study area are currently operating with a peak period v/c ratio of 0.60 or lower, indicating few traffic congestion issues. The roadway sections which do have a v/c greater than 0.60 are

located within more densely developed areas of Lawrenceburg, Madison, and Versailles. All roadways will experience some increase in daily traffic volumes over the next 25 years. Within the SR 101 study area, daily vehicle miles of travel (VMT) are projected to grow 28 percent between 1998 and 2025. However, about 93 percent of roadway miles will continue to experience a v/c ratio less than 0.60, indicating no emerging congestion problems. As is the case under existing conditions, some roadways in Lawrenceburg, Madison, and Versailles will continue to experience v/c rates over 0.60, indicating some localized congestion concerns.

1.3 Local Economic Conditions

The SR 101 study area is predominantly rural with only a few areas of concentrated development, including Versailles, Lawrenceburg and Aurora, and Madison. For the most part, development is sparse and recent growth in employment opportunities has been limited to jobs in the Service Sector generated by the development of gambling casinos and their adjacent hotels. The future of the region's economy has been a concern expressed by many local citizens, public officials, and business leaders. Accessibility is seen by these individuals as a key consideration in the enhancement of economic opportunities and encouragement of new development.

Corroborating the issue of economic development in Southeastern Indiana is the recent United States Department of Agriculture's annual Strategic Plan for rural development in Indiana.[2] The USDA identified certain rural counties in Indiana as "stressed," meaning that the area was having difficulty in being "successful and sustainable." Eleven factors were used in this evaluation, including housing-related infrastructure, population change, household income, employment, healthcare, and business growth. Out of 92 Indiana counties, Switzerland County ranked as the fourth most stressed. Of the 11 ranking factors, Switzerland County was among the top 20 highest need counties for five factors and the top 10 highest need counties for three factors, including persons living in poverty.

In recent years, the most significant change in the SR 101 study area affecting travel demand has been the development of three riverboat casinos on the Ohio River. The Indiana Riverboat Gambling Act, which became effective July 1, 1993, legalized casino gaming on riverboats. This legislation permitted the licensing of 11 riverboats, of which five were authorized for the Ohio River. Three of these Ohio River riverboat casinos are located in the SR 101 study area. Both the Argosy Casino in

[2] USDA Rural Development Strategic Plan for Indiana, Revised January, 2001.

Lawrenceburg and the Grand Victoria Casino in Rising Sun opened for business in 1996. The third casino, Belterra, opened near Vevay in 2000. Each of these facilities operates from 9:00 a.m. until the late evening-early morning hours, seven days a week. Each facility includes a hotel with 200 to 300 rooms. Both the Grand Victoria and Belterra also have 18-hole golf courses. In total, these three casinos and associated hotel and resort developments employ approximately 5,000 people, equal to about 20 percent of the total employment of Switzerland, Ohio, and Dearborn counties.

Patronage at these facilities is drawn from the region at-large, encompassing the metropolitan areas of Columbus, Cincinnati, Dayton, Louisville, and Indianapolis. For each of these facilities, accessibility was cited in interviews with casino operators as a critical concern, particularly in regard to the ability of these facilities to compete with facilities located closer to major urban areas with more direct highway access.

1.4 Study Purpose and Need

An initial element of the SR 101 Corridor Improvement Feasibility Study was the development of a statement of the study's purpose and need. Definition of purpose and need was based on a technical assessment of current and future conditions within the study area as well as input from state and federal resource agencies, the SR 101 Corridor Advisory Committee, and the public-at-large. Two key transportation needs were identified for the study area which provided a basis for development and assessment of improvement alternatives:

- Improve roadway safety and reduce accident frequency; and
- Improve regional accessibility and connectivity.

1.4.1 Improve Roadway Safety

An analysis of accidents throughout the five-county study area was performed using INDOT accident data from 1996 to 1998. These data were used to assess personal injury and fatality rates within the study area compared to the state of Indiana as a whole.

Table 1.1 summarizes injury and fatality rates on State Arterial and Collector Roadways by county. As indicated in the table, both Dearborn and Switzerland Counties had injury rates higher than the 1996 to 1998 state average, and all study area counties with the exception of Dearborn County had fatality rates equal to or higher than the state average. This

problem is particularly evident in Switzerland County which had an injury rate 36 percent higher and a fatality rate 335 percent higher than the state average.

Table 1.1 Summary of Injury and Fatality Rates on State Arterial and Collector Roadways

County/State	Daily VMT	Injuries (1996-1998)	Fatalities (1996-1998)	Injury Rate*	Fatality Rate*
Dearborn	683,884	567	11	83.7	1.6
Jefferson	422,786	249	7	59.5	1.7
Ohio	94,299	62	2	66.4	2.1
Ripley	400,732	245	13	61.8	3.3
Switzerland	109,894	108	8	99.3	7.4
Indiana	73,128,283	53,022	1,197	73.2	1.7

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT data.
Note: * Per 100 million annual vehicle miles of travel.

As traffic volumes within the study area continue to increase, accidents rates would also be expected to increase. Every accident represents a risk to human safety, as well as costs incurred by motorists and government agencies. In turn, efforts to reduce accidents represent potential benefits to motorists, communities, and government agencies in the study area and in Indiana. Of particular concern is the frequency of fatal accidents within the study area. This indicates a critical need to reduce the number and severity of accidents throughout the study area.

1.4.2 Improve Regional Accessibility and Connectivity

Due to a lack of north-south roadway connections in Switzerland and Ohio counties, the issues of accessibility and connectivity to major metropolitan areas in the surrounding region have been cited as major concerns in the study area.

A major factor influencing travel patterns within the study area is the location and number of Ohio River crossings. The 60-mile stretch of the Ohio River that forms the southeastern boundary of the study area is crossed by three bridges – at Madison, Markland, and Lawrenceburg. The

Route 101 Markland Dam Bridge is about 30 miles downstream from Lawrenceburg and about 30 miles upstream from Madison.

The bridge at Madison carries about 10,000 vehicles per day (vpd), and the bridge at Markland Dam carries about 2,000 vpd. I-275, which crosses the Ohio River near Lawrenceburg, serves as a bypass route around greater Cincinnati area, and the U.S. 50/I-275 connector carries about 25,000 vpd. In Indiana, regional access to the Markland Dam Bridge is constrained because access is provided by SR 156, a two-lane rural minor arterial running along the Ohio River. Furthermore, there is no continuous north-south arterial route from the Markland Dam to U.S. 50 and onto I-74. In Kentucky, the Route 101 Markland Dam Bridge connects to U.S. 42 and is about 10.1 miles via U.S. 42 and KY 35 from I-71 in northern Kentucky. The I-71 to U.S. 42 Connector under construction in Kentucky will shorten the distance between the Markland Dam Bridge and I-71 to 7.4 miles.

The recent draft Purpose and Need Statement prepared for the I-69 Evansville-to-Indianapolis Study's Tier 1 Environmental Impact Statement[3] documents an analysis of personal accessibility for the entire state of Indiana. As defined in the I-69 Study's Purpose and Need Statement, "the concept of personal accessibility refers to the ease with which residents of a particular region can travel to population and employment centers and other types of attractions (e.g., health facilities, educational institutions, airports, and cultural events). Generally, a region that is well-connected internally and externally to common travel destinations will have a high degree of accessibility." Although the focus of the I-69 effort is on the southwestern portion of the state, the assessment covered the entire state and equally relevant information on accessibility was developed for southeastern Indiana and the SR 101 study area.

Detailed documentation of the analysis approach is provided in the draft I-69 Purpose and Need Statement. In summary, each traffic analysis zone (TAZ) in the model was assigned an "attractive force" (AF) rating where the higher the accessibility rating, the stronger the attraction of that TAZ as a destination for a particular type of travel – e.g., travel to urban areas, to airports, etc. The travel demand model calculates congested travel time between each TAZ and all other TAZ's in the state and then takes into account actual travel behavior in terms of an impedance factor that accounts for drivers' willingness to travel given alternative distances to destinations. This is then used to calculate an "accessibility index." The index for each TAZ is determined by calculating the ratio of attractive force to travel time between that TAZ and every other TAZ, and then

[3] Bernardin, Lochmueller & Associates, Inc., I-69 Evansville-to-Indianapolis Study Tier 1 Environmental Impact Statement, Draft Purpose and Need Statement, Prepared for the Indiana Department of Transportation, April 17, 2001.

calculating the sum of those ratios. The accessibility index for a TAZ will tend to be high (or more accessible) if the TAZ has short travel times to a large number of TAZ's with high attractive force ratings or low if the TAZ is surrounded by other TAZ's with low attractive force ratings or long travel times to TAZ's with higher attractive force ratings.

Using this methodology, the I-69 study team developed accessibility index measures for various single types of attractions. The relevant findings of this analysis for the SR 101 study area can be summarized as follows:

Accessibility to Populations Centers – The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998. Accessibility to these areas improves slightly in 2025.

Accessibility to Employment – The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998. Accessibility to these areas improves slightly in 2025.

Accessibility to Urban Areas – The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998 and remain among the least accessible areas in 2025.

Accessibility to Major Airports – The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Accessibility to these areas improves slightly in 2025.

Accessibility to Institutions of Higher Education – The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Switzerland and Ohio Counties are among the least accessible areas of the state in 1998 and remain among the least accessible areas in 2025.

This analysis of regional accessibility substantiates local perceptions that regional accessibility is limited for at least some travel purposes, specifically travel to urban areas and institutions of higher learning. Limited accessibility to urban areas can affect local development opportunities due to higher travel times to these areas than from other locations in Indiana. Higher travel times can result in comparatively higher transportation costs to key economic activity centers such as urban areas.

1.5 Description of Preliminary Alternatives

All "Build" alternatives were developed with two options – a southern segment providing connection from the southern portion of the study area to U.S. 50 and an optional northern segment which includes the southern segment but also provides a connection from U.S. 50 to I-74 at the northern edge of the study area. It should be noted that at the time of this study's initiation, the study objective was to examine the feasibility of potential connections to U.S. 50 as the northern terminus of SR 101 corridor improvements. As the study has progressed, resulting in further understanding of needs of the study area, study objectives have expanded to encompass the feasibility of a corridor with a northern terminus at I-74. Therefore, each Build alternative was defined with two options – a northern terminus at U.S. 50 and a northern terminus at I-74. In order to distinguish between these options, each alternative option terminating at U.S. 50 is designated as an "A" alternative; "B" alternatives *include their complementary "A" alternative* continuing to a northern connection to I-74.

The following alternatives were initially considered:

- **Alternative 1A and 1B:** A roadway between Markland Dam (east of Vevay on SR 156) and SR 129 at U.S. 50 (east of Versailles) with possible upgrade of SR 129 to I-74;

- **Alternative 2A and 2B:** A roadway between Markland Dam (east of Vevay on SR 156) and SR 101 at U.S. 50 (east of Versailles) with possible upgrade of SR 101 to I-74;

- **Alternative 3A and 3B:** A roadway between Markland Dam (east of Vevay on SR 156) to U.S. 50 east of Dillsboro with possible extension to I-74;

- **Alternative 4:** Transportation systems management (TSM) enhancements on SR 129 between SR 250 and SR 56; on SR 56 between Vevay and SR 250; and, on SR 156 between Vevay and Rising Son; and

- **Alternative 5:** Do nothing or No Build.

Following the publication and circulation of the SR 101 Draft Preliminary Alternatives Report in October 2001, meetings were held with interested parties to obtain further input into the identification of preliminary alternatives for the SR 101 Study Area. This included meetings in November 2001 with the SR 101 Advisory Committee and the federal and state resource agencies, and a widely publicized public information meeting in Versailles. Based on input from these meetings, additional alternatives were identified for consideration.

At the meeting of resource agencies mentioned above, multiple alternatives were submitted by U.S. Environmental Protection Agency, Region 5 for consideration. To maintain a consistent means of identification, the numbering scheme used to identify the additional alternatives maintains compatibility with the numbering of alternatives submitted by U.S. EPA staff. Based on an initial staff level screening, some of these alternatives were found to be similar to other alternatives or involve corridor alignments which are significantly longer in distance than comparable alternatives. Therefore, some of these proposed alternatives were eliminated from further consideration, resulting in gaps in the numbering sequence.

The additional alternatives retained for further screening are as follow:

- **Alternative 9A and 9B:** Upgrade of SR 156 west of Vevay and SR 129 north to U.S. 421 into Versailles with possible upgrade of U.S. 421 north of Versailles to a new roadway connecting U.S. 421 with SR 229 to Batesville and I-74;

- **Alternative 11A and 11B:** A roadway between Markland Dam to SR 56/SR 250 junction with upgrade of SR 56 to Aurora; possible extension involving upgrade of SR 148 and new roadway to SR 1, connecting to I-74 in Saint Leon; and

- **Alternative 16A and 16B:** Upgrade of SR 129 from Vevay to new roadway connecting SR 129 south of Versailles to SR 129 at U.S. 50 east of Versailles; possible upgrade of SR 129 north of U.S. 50 to I-74.

Table 1.2 provides a summary of the ranking of each alternative according to preliminary screening criteria of safety, accessibility, new roadway construction, and impacts to 4(f) properties.[4]

Some further observations:

- The TSM alternative may address the identified goal of improved travel safety but it does not address the goal of improved regional accessibility and connectivity. TSM enhancements could potentially be incorporated as spot improvements into other Build alternatives which

[4] Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) declares that "It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges and historic sites." Section 4(f) applies to publicly owned lands which are managed as parks and recreation areas, wildlife or waterfowl refuges, and to all historic sites regardless of ownership.

address the goal of improved regional accessibility and connectivity to enhance overall roadway safety.

- Alternatives 9A/9B and 11A/11B provide little or no improvement in accessibility between key locations in the study area.

- It is not intuitively apparent that Alternative 9B, and 16 A/B would draw significant traffic from I-74. Traffic oriented to/from Indianapolis would have more direct southerly access via U.S. 421. Traffic oriented to/from Ohio and Cincinnati would be able to utilize either U.S. 50 to Dillsboro or SR 56 from Lawrenceburg. However, both Alternatives 9B and 16 A/B provide improved continuity to the study area's existing road network.

- Alternatives 1B and 2B follow parallel corridors, however Alternative 2B provides a more direct, shorter connection to I-74.

Table 1.2 Summary Evaluation of Preliminary Alternatives

Alternative	Description	Safety Ranking	Accessibility Ranking	Estimated Length of New Construction (miles)	Impact to 4(f) Properties
No Build/TSM					
4	TSM Enhancements	M	L	33.8	No
5	No Build	None	L	0.0	No
Build (to U.S. 50)					
1A	Roadway to SR 129/U.S. 50	M	H	23.2	Possible
2A	Roadway to SR 101/U.S. 50	M	H	21.5	No
3A	Roadway to U.S. 50 (via SR 56)	H	H	16.9	No
9A	SR 156 to SR 129/U.S. 421 (Versailles)	M	L	7.2	Possible
11A	Roadway to SR 250/SR 56 (to Aurora)	M	M	19.1	No
16A	SR 129 Connector	M	M	12.7	Possible
Build (to I-74)[2]					
1B	Roadway to SR 129/U.S. 50/I-74	M	H	23.2	Possible
2B	Roadway to SR 101/U.S. 50/I-74	H	H	38.8	No
3B	Roadway to U.S. 50 (via SR 56)/I-74	H	H	35.3	No
9B	SR 156 to SR 129/U.S. 421/SR 229 (Batesville)/I-74	M	L	22.1	Possible
11B	Roadway to SR 250/SR 56/SR 148/SR 1 (St. Leon)/ I-74	M	M	29.3	No
16B	SR 129 Connector/I-74	M	M	12.7	Possible

Note: L = Low; M = Medium; H = High.

1.6 Alternatives Selected for Detailed Analysis

Based on the screening in the preceding section and the evaluation discussed above, it was recommended that the SR 101 Corridor Improvement Feasibility Study adopt the following alternatives for detailed analysis:

- **No Build –** This alternative is required for conventional alternatives analysis. It provides a baseline for comparison of impacts resulting from Build alternatives.

- **Alternative 2B –** This alternative ranks high in terms of improved accessibility between key locations in the study area as well as potential safety benefits. It would result in substantial improvement to existing roadway (SR 101 north of U.S. 50) while taking advantage of an existing interchange on I-74 with direct access to the existing SR 101 corridor. This alternative is shown in Figure 1.2.

- **Alternative 3B –** This alternative ranks highest in terms of improved accessibility between key locations in the study area and also ranks high for potential safety benefits. It would require development of a new right-of-way north of U.S. 50, rather than adaptation of an existing right-of-way. It also would provide for a new interchange on I-74. This alternative is shown in Figure 1.3.

- **Alternatives 16B –** This alternatives requires the least amount of new construction either on new ROW or reconstruction of existing ROW of all alternatives providing an improved connection to I-74 at the northern edge of the study area. Although it appears to provide limited potential for improved accessibility, this alternative provides a potentially less disruptive opportunity to improve continuity while making maximum use of the existing highway network of the study area. It also provides a bypass for north-south traffic around the town center of Versailles which may benefit from improved traffic operations. This alternative is shown in Figure 1.4.

Figure 1.2 Alternative 2A and 2B – Roadway to SR 101/U.S. 50

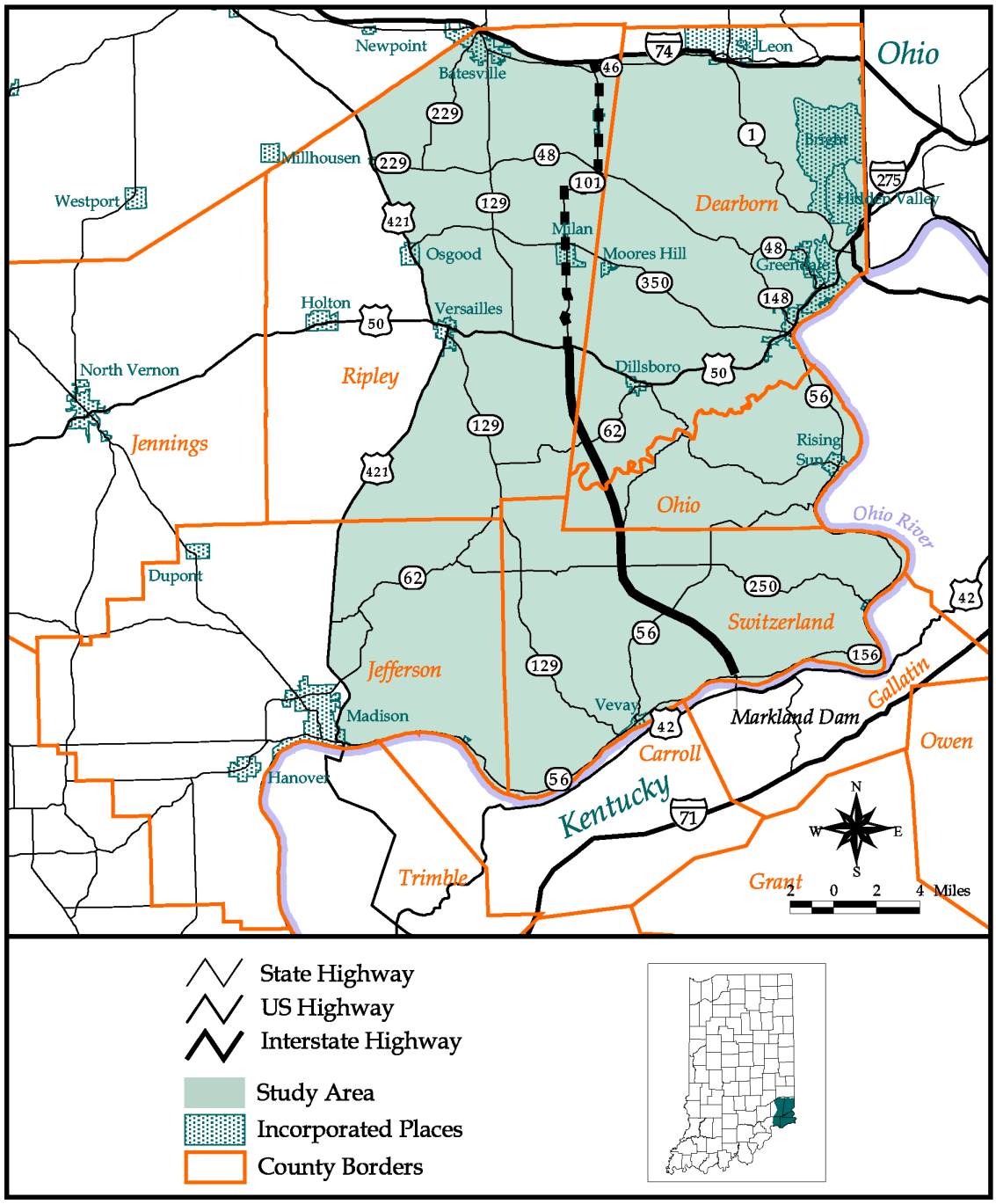


Figure 1.3 Alternative 3A and 3B – Roadway to U.S. 50 (via SR 56)

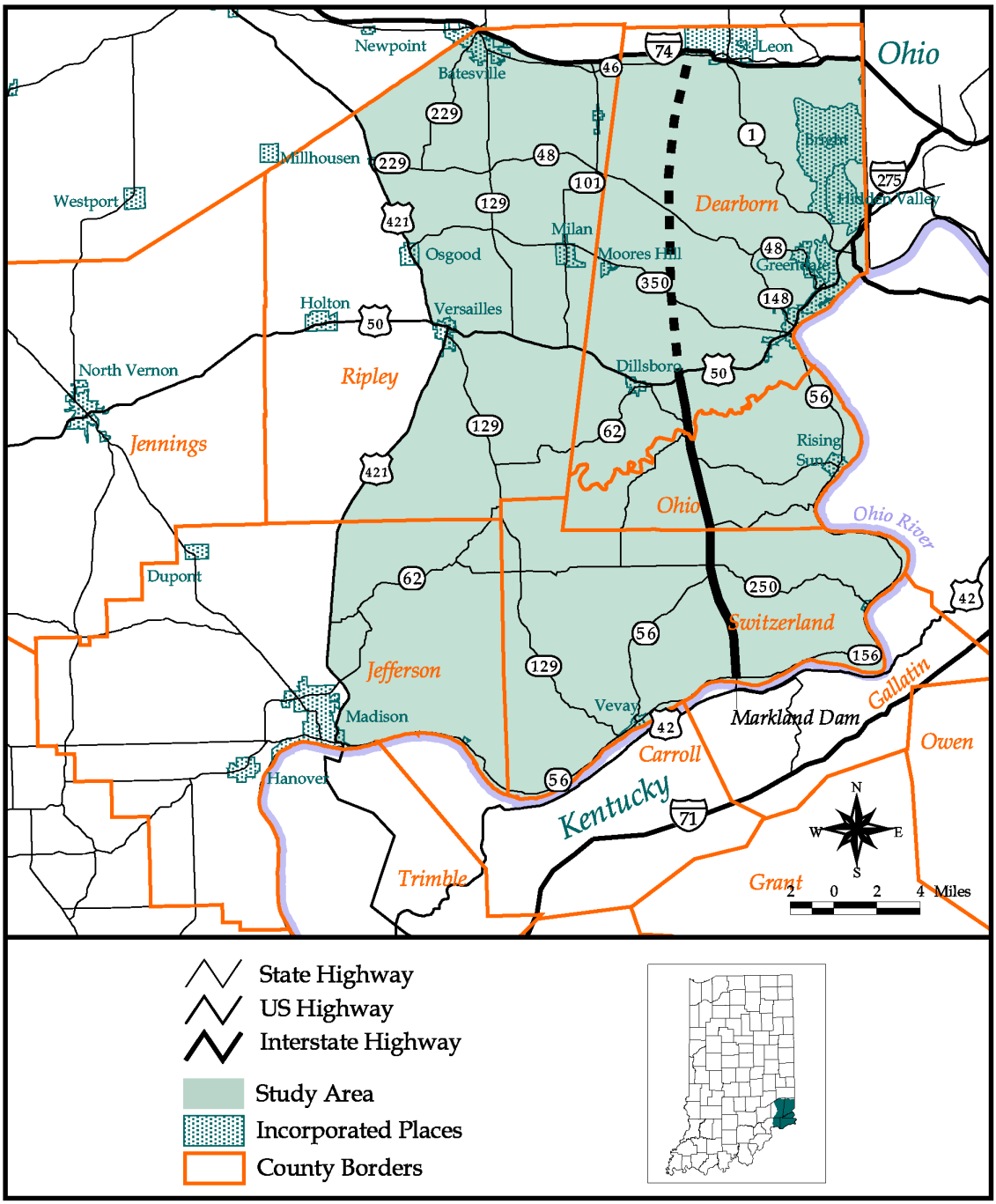
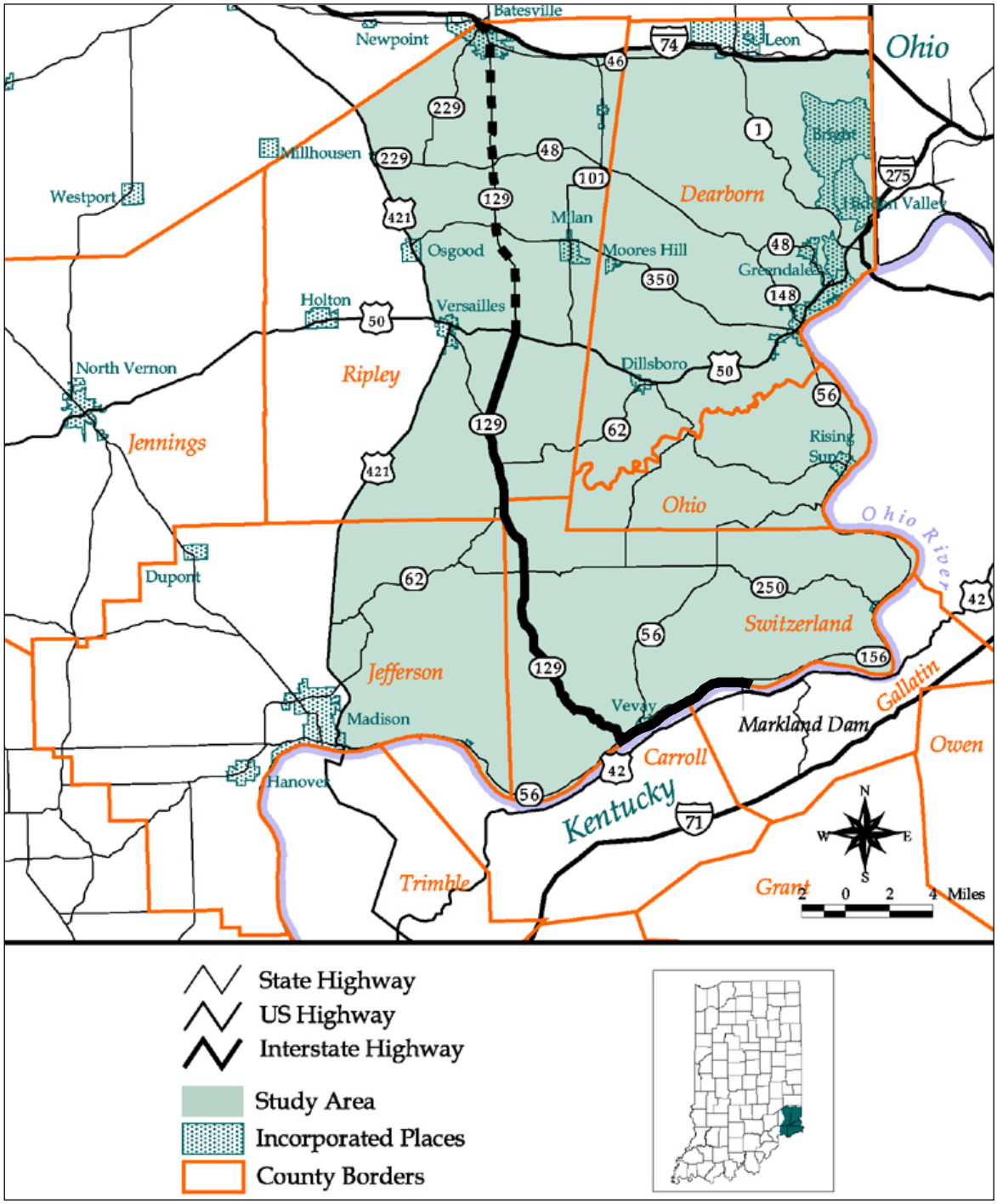


Figure 1.4 Alternative 16A and 16B – SR 129 Connector



1.7 Costs of Construction and Operations and Maintenance

Table 1.3 shows the estimated costs in 1998 dollars for construction and operation and maintenance of each of the Build alternatives. Costs were calculated based on an approximation of the roadway alignment and right-of-way. It should be emphasized that alignment and right-of-way are subject to change as a project moves forward into later stages of engineering and design.

Given the possibility that a Build alternative might be constructed in phases, costs are shown for each alternative for an "A" option representing the segment from the southern end of the study area to U.S. 50 and for a "B" option which includes both the "A" option segment south of U.S. 50 **and** the segment north of U.S. 50 to I-74. For Alternatives 2 and 3, costs are shown for both two-lane and four-lane facilities. Projections of initial traffic volumes and expectations relevant to the rate of traffic growth on the proposed roadways indicate that a two- or three-lane facility should be sufficient to serve expected demand in the near term. However, as discussed in following sections, forecasts of future traffic indicate that development of a four-lane facility along portions of the alternative alignments may eventually be warranted. Therefore consideration should be given to acquisition of right-of-way sufficient for the future expansion to a four-lane facility dependent on future traffic growth.

1.8 Summary Evaluation of Build Alternatives

Table 1.4 presents a summary evaluation of each of the three Build alternatives based on various criteria identified in the early stages as representative of study area needs. The Key Factors shown in the table address the transportation needs of the study area identified in the development of the study's Purpose and Need Statement. Secondary Factors shown in the table address additional quantitative criteria which provide further information to be considered in determining which alternative or alternatives provide the greatest benefits for the SR 101 study area and the state of Indiana overall. The factors shown in **bold type** in the table indicate which alternative rated the highest or most beneficial for that particular criterion.

Table 1.3 Construction and Operating/Maintenance Costs

Alternative	Length (Miles)	Length New Construction (Miles)	Length Reconstruction (Miles)	Length No Construction (Miles)	Construction Costs Pavement (98$)	Construction Costs Bridges (98$)	Right-of-way Costs (98$)	Utility Costs (98$)	Soft Cost (Engineering, Legal, Studies) (98$)	Total Project Capital Costs (98$)	Annual Operating and Maintenance Cost (98$)
Cost by Alternative: Two-Lane Facilities											
2A	21.5	21.5	0.0	0.0	$48,117,000	$2,808,000	$2,084,848	$4,300,000	$8,487,502	$65,797,350	$617,050
2B	38.8	21.5	17.3	0.0	$85,485,000	$3,744,000	$2,084,848	$7,760,000	$14,871,503	$113,945,351	$617,050
3A	16.9	16.9	0.0	0.0	$38,181,000	$1,528,800	$1,638,788	$3,380,000	$6,618,301	$51,346,889	$485,030
3B	35.3	35.3	0.0	0.0	$86,325,000	$4,336,800	$3,423,030	$7,060,000	$15,110,303	$116,255,133	$1,013,110
16A	33.7	5.2	7.5	21.0	$29,109,000	$936,000	$560,000	$2,540,000	$5,007,501	$38,152,501	$149,240
16B	51.0	6.2	7.5	37.3	$31,269,000	$9,336,000	$632,727	$2,740,000	$6,767,501	$50,745,229	$177,940
Cost by Alternative: Divided Four-Lane Facilities (Alternatives 2 and 3)											
2A	21.5	21.5	0.0	0.0	$91,977,000	$5,616,000	$3,127,273	$4,300,000	$16,265,503	$121,285,776	$617,050
2B	38.8	21.5	17.3	0.0	$164,637,000	$7,488,000	$4,804,848	$7,760,000	$28,687,506	$213,377,354	$617,050
3A	16.9	16.9	0.0	0.0	$72,657,000	$4,617,600	$2,458,182	$3,380,000	$12,879,103	$95,991,884	$485,030
3B	35.3	35.3	0.0	0.0	$158,337,000	$10,233,600	$5,134,545	$7,060,000	$28,095,106	$208,860,251	$1,013,110

1.8.1 Key Factors

Safety (Section 5.2.4)[5]

Table 1.4 shows a summary of predicted total accident reductions for each alternative. The table shown is a composite total all accidents reduced (fatal, injury, and property damage) for both autos and trucks as predicted by the NET_BC model. Alternative 2B is shown to be the most effective in reducing accidents for the forecast year (2025), largely as a result of diversion of traffic to higher classification roadways with lower average accident rates per mile of travel.

Table 1.4 SR 101 Summary Evaluation of Alternatives

	Alternative 2B	Alternative 3B	Alternative 16B
Key Factors			
Safety			
Annual Accidents Reduced	**284**	169	-1
Accessibility			
Percent increase in population within 45 minutes	3.08%	**6.26%**	1.82%
Percent increase in population within 120 minutes	2.23%	**2.81%**	1.28%
Percent increase in jobs within 180 minutes	0.78%	**1.62%**	0.38%
Average linkage index – distance	0.78	**0.85**	0.66
Average linkage index – travel time	0.75	**0.83**	0.63
Secondary Factors			
Mobility			
Change in VMT	+34,680	**+20,224**	+73,694
Change in VHT	**-4,920**	-4,429	-3,587
Environmental			
Potential residential acquisitions	66	84	**43**
Wetlands impacted	34	41	**8**
Acreage acquired	940	856	**127**
Economic			
User benefits (in millions of dollars)	$17.8	**$37.8**	-$18.3
Change in employment	301	**538**	170
Change in personal income (in millions of dollars)	$12.1	**$22.7**	$7.2

[5] Detailed discussion of the basis for the various factors can be found in Section 5.0 of this report, as indicated parenthetically for each factor.

Accessibility (Section 5.2.4)

Table 1.4 summarizes the potential accessibility benefits of each alternative based on the extent to which each alternative increases the size of population and employment within defined travel times of the study area and also the extent to which each alternative improves the efficiency of connections between key study area locations, based on distance and travel time. Alternative 3B is shown to provide the greatest benefits relative to improved accessibility. Alternative 3B is the most effective in increasing the size of population and jobs within defined travel times of the study area and also providing a more efficient connection between key locations within the study area.

1.8.2 Secondary Factors

Mobility (Section 5.2.2)

Two important indicators of how well a transportation improvement benefits mobility is the effect it has on vehicle miles of travel and vehicle hours of travel. As discussed in Section 5.0, all three Build alternatives result in diversion of traffic from lower speed but more direct roadways to the new alternative alignments. While these alignments have higher design speeds than competing routes, their use may result in a more indirect trip and longer travel distances. This occurs even though the new alternatives may provide more direct routes for travel **within** the SR 101 study area, because a majority of trips utilizing the new alignments of all three Build alternatives are through trips with no origin or destination within the study area. As indicated, all three alternatives produce some increase in statewide VMT, although Alternative 3B produces the least increase. All three alternatives produce a decrease in VHT, the largest decrease being produced by Alternative 2B.

Environmental (Section 5.3)

Table 1.4 summarizes a number of the environmental criteria discussed in Section 5.0. Given that Alternative 16B primarily follows the existing SR 129 right-of-way and involves a limited amount of new construction to provide greater continuity between segments of SR 129 north and south of U.S. 50, the environmental impacts of Alternative 16B are the smallest of the three alternatives. These impacts are noted in terms of potential residential property acquisitions, wetlands impacted, and acreage acquired.

Economic (Section 5.5)

From an economic perspective, user benefits accounts for the value of travel time, travel cost, and travel safety. Travel time benefits are a function of reduced vehicle hours of travel which result from higher vehicle speeds and reduced travel delay. Travel cost benefits are a function of the cost of fuel, tires, lubricants, maintenance, and depreciation resulting from reduced travel time and vehicle miles of operation. Travel safety benefits result from reduced vehicle miles of operations and diversion of traffic from lower classification to higher classification facilities with lower accident rates per mile of travel. The analysis of user benefits, discussed in Section 5.5, found that Alternative 3B produced the highest user benefits of the three Build alternatives.

Benefits to users of the transportation system can produce direct benefits for businesses in the study area by reducing the cost of existing business-related trips. As intercity transportation conditions improve, highway improvements can improve access to strategic markets and make an area more attractive as a place to do business, resulting in increased sales and productivity. Improved accessibility can also enhance an area's ability to attract tourism, a particular consideration in the SR 101 study area. This combination of factors can translate into increased employment and personal income. As predicted through the application of the REMI model discussed in Section 5.5, Alternative 3B is the most effective alternative for increasing employment and personal income in the SR 101 study area.

■ 1.9 Recommendations and Next Steps

Based on the evaluation of the three Build alternatives, specifically with respect to the key evaluation factors corresponding to the identified needs of the SR 101 study area, Alternative 2B rates highest in terms of Safety and Alternative 3B rates highest in terms of Accessibility. With respect to the secondary factors, all alternatives result in increased vehicle miles of travel (VMT) and reduced vehicle hours of travel (VHT). Alternative 2B is most effective in reducing VHT. However, Alternative 3B produces the greatest benefits relevant to all Economic criteria. Alternative 16B results in the least environmental impacts relevant to the various Environmental criteria.

Despite its lowest environmental impacts, Alternative 16B produces virtually no change in the rate of accidents and little benefits relevant to improved accessibility – both primary needs of the study area. It also produces the least economic benefits for the study area. As a result, it is recommended that this alternative be removed from further consideration.

Both Alternative 2B and 3B are found to produce tangible benefits with respect to accessibility and safety although Alternative 3B provides both of these benefits plus significant economic benefits for the study area. In terms of construction costs, Alternatives 2B and 3B are approximately equivalent, although the cost of constructing only the southern segments of Alternative 3B between Markland Dam and U.S. 50 is about 25 percent less than the cost of Alternative 2B. This is particularly relevant in consideration of how the construction of a project could be phased, as discussed below. Therefore it is recommended that Alternative 3B be retained for further consideration and analysis, with particular attention directed to ways of phasing the alternatives to serve areas of greatest need and of designing the improvements to maximize their cost-effectiveness.

The design of the improvements encompassed by Alternative 3B should take the following factors into account:

- As shown in Section 5.2, projections of AADT traffic volumes on the new roadway indicate potential for substandard level-of-service operations if the new roadway is constructed as a two-lane facility. However, given existing traffic and development trends in the study area, it appears that construction of four-lane facility would be excessive. As also discussed, more than half of the projected traffic using the new facility is through-traffic which is diverted from alternate and, in some cases, more direct travel routes due to comparatively higher design speeds on the proposed new roadways. At least a portion of this through-traffic is likely to not make this diversion. Based on these forecasts, it appears that a design waiver should be considered by INDOT to allow construction of a two-lane facility while acquiring adequate right-of-way to allow for future widening if eventual growth in demand warrants.

- During the design stage of project development, the physical layout of the facility would be more accurately determined, addressing the need and appropriate locations of turning and climbing lanes to enhance safe operations and roadway capacity. It is anticipated that a three-lane cross-section will be needed in some portions of the new roadway.

- Analysis of truck movements in the study area indicates that a new roadway to Markland Dam, connecting with the new road between U.S. 42 and I-71 in Kentucky, would attract substantial truck traffic from alternate routes such as U.S. 421, SR 129, and SR 56. By removing trucks from alternate and potentially less safe routes, there are significant safety benefits for the study area. This also provides economic benefits as a result of reduced travel time and shipping costs for shippers and freight handlers. However, for study area residents in the vicinity of new or improved roadways or adjacent roadways which may experience increased truck volumes, there could be legitimate

cause for concern if increased truck traffic leads to localized congestion, noise, and safety issues. In designing new facilities, it will be important to assess these localized impacts, identify opportunities for mitigation including possible bypass routes where warranted, and assure affected residents that roadways will be designed to provide safe and efficient traffic operations.

Project Phasing and Next Steps

Given the cost of constructing Alternative 3B in its entirety between Markland Dam and I-74, particularly during this period of constrained state and federal budgets, it is recommended that the project proceed in phases, initially addressing highest priority improvements and completing the project as need and financial capability may warrant. These implementation phases would consist of the following:

- **Phase 1:** Identification of specific locations of high accident frequency and/or severity in Switzerland and Ohio Counties and application of low-cost TSM-type safety improvements. Such improvements can be expedited and applied on an as-needed basis to address the highest priority locations in advance of any substantial new highway development project. Priority roadways should be SR 56 and SR 156 as described in Section 4.1 ("Alternative 4"). Improvements to SR 129 in Switzerland County are programmed for construction in 2003.

- **Phase 2:** Design and construct the southern portion of Alternative 3B (described as "Alternative 3A" in Section 4.0) between Markland Dam and U.S. 50. Travel demand forecasts of this roadway (without the extension between U.S. 50 and I-74 to the north) show AADT on this roadway in 2025 nearly equivalent to the volume which would be carried with the fully constructed roadway alternative to I-74. In the absence of the connection to I-74, traffic to the new roadway south of U.S. 50 is carried by SR 129 from the northwest and U.S. 50 from the northeast. However, added traffic on U.S. 50 in the vicinity of Lawrence, which currently experiences congested operations, may be problematic in the absence of capacity improvements in this area. Concurrent with the construction of the southern portion of the alignment, the right-of-way for the northern portion from U.S. 50 to I-74 should be delineated with efforts undertaken to preserve the right-of-way for future development.

- **Phase 3:** Completion of the northern portion of Alternative 3B from U.S. 50 to I-74.

Implementation of each phase will require appropriate programming and funding. In order to move these improvements forward, it is

recommended that TSM-type safety improvements be programmed in the State Transportation Improvement Program (STIP) in the next update cycle, with identification of approximate funding amounts and funding sources. TSM-type safety improvements can be funded in large part using federal Surface Transportation Program (STP) funds. It is also recommended that the next update of the Statewide Long-Range Transportation Plan identify the development of a new roadway between Markland Dam and U.S. 50 as a planned improvement to the regional highway system. Inclusion of the planned improvement in the Statewide Long-Range Transportation Plan is the first step in the implementation process and is a necessary step toward the programming of the project in the STIP.

An important consideration in the programming and construction of new roadway facilities is Indiana's statutory limitation on the number of highway miles which can be maintained as state highway. By law, this ceiling on state highway mileage cannot be exceeded and construction of new state highway can necessitate the relinquishment of existing state highway to county or municipal authorities. This entails a negotiated agreement between INDOT and the local authorities, taking into account the benefits provided by new facilities and potential redundancy with pre-existing roadways. Depending on final design, implementation of Alternative 3B could compel relinquishment of portions of state roadways parallel to the new alignment in the following counties:

- Switzerland County;
- Ohio County; and
- Dearborn County.

Funding of a new roadway to the extent recommended will present a challenge to INDOT, given current funding conditions and competition among numerous projects for limited resources. Identification of innovative funding sources apart from traditional state and federal funding could enhance the feasibility of project implementation. One source which should be considered are potential contributions from the casinos now operating along the Ohio River within the SR 101 study area. The Belterra Casino and Resort near Markland Dam would directly benefit through improved access from the Indianapolis and Cincinnati markets. Both the Grand Victoria in Rising Sun and the Argosy in Lawrenceburg could also benefit, although to a lesser extent. As a result, casino owners may be willing to contribute project development funds to facilitate eventual development of a new north-south roadway.

2.0 Description of Study Area: Existing and Future Conditions

The following section is a description of overall roadway conditions, current and forecasted future traffic volumes, and programmed roadway improvements within the study area. Also included is a discussion of local economic conditions, and historical activities and developments which have a bearing on traffic and transportation needs in the SR 101 corridor. These include the 1990 Roadway Analysis of SR 101 and SR 129, development of gambling casinos along the Ohio River, and recent growth in employment and development of new roadways in Northern Kentucky.

2.1 Study Area Description

2.1.1 Study Area Location and Roadways[1]

As shown in Figure 1.1, the study area is located in southeastern Indiana and includes all of Ohio and Switzerland Counties, all of Dearborn County south of Interstate 74, and Ripley and Jefferson Counties east of U.S. 421.

Major roadways within the study area include:

- U.S. 50 – U.S. 50 is classified as a "rural principal arterial" and is part of the National Highway System (NHS). It passes through south-central Indiana and links the study area to Cincinnati on the east and I-65 near Seymour on the west. Except for I-74 on the northern edge of the study area, and I-71 to the south of the study area in Kentucky, U.S. 50 is the only route with east-west continuity through the study area.

- U.S. 421 – U.S. 421 is a "rural principal arterial" and is also on the NHS. It links Madison in Jefferson County to I-74 at Greensburg. It forms the

[1] Detailed information on study area roadways is contained in the Existing Conditions Report for the SR 101 Corridor Improvement Feasibility Study, prepared for INDOT by Bernardin, Lochmueller & Associates, Cambridge Systematics, Inc., and Dyer Environmental Services, May 2001.

western edge of the study area and is the only route within the study area with north-south continuity.

- SR 129 – SR 129 is classified as a "rural minor arterial" from I-74 to U.S. 50 in Ripley County and a "rural major collector" from U.S. 50 and SR 56 for the balance of the route in Ripley County and Switzerland County. It is the only route in the study area east of U.S. 421 that passes through the entire north-south length of the study area. However, SR 129 lacks continuity and requires east-west use of U.S. 50 near Versailles for approximately two miles in order to travel north-south the length of the study area.

- SR 56 and SR 62 – SR 56 and SR 62 are east-west "rural major collectors" in the southern portion of the study area, linking Madison, Dillsboro, and Lawrenceburg. Both routes meander in terms of their predominant orientation and involve diversions onto other routes.

Overall, about 90 percent of the roadways in the study area have two lanes. The quality of traffic flow is influenced by the number of lanes. Conditions on a two-lane roadway (one lane each direction) can prevent opportunities to pass other vehicles and maintain a constant travel speed. The remaining 10 percent of area roadways have four travel lanes. These roadways include I-74 and U.S. 50 between SR 101 and Lawrenceburg. In Madison, U.S. 421 also has four lanes and a short six-lane section of U.S. 50 exists in Lawrenceburg near the I-275 connector.

Another indicator of roadway operating quality is the number of curves per mile. More than one curve per mile with severe operating speed restrictions may be cause for concern, as drivers experience a more difficult time controlling their speed and maneuvering safely on the roadway. In part, due to the particularly hilly terrain of southeastern Indiana, three routes in the study area exhibit a rate of one curve/mile or higher over an extended stretch of the route. SR 129 in Switzerland County between SR 56 in Vevay and SR 250, has over one curve per mile over a 15-mile stretch of roadway. This section of roadway was identified in the 1990 SR 101 Corridor Study for reconstruction to eliminate many of the curves, thus improving mobility along this corridor. SR 62 between Dillsboro and SR 129 has over 1.5 curves per mile over a 16-mile stretch. There are sharp curves along this section and trucks reportedly avoid using this roadway. Finally, SR 56 within Ohio and Switzerland Counties has approximately one curve per mile over a 30-mile length of road between Vevay and the border between Ohio and Dearborn Counties.

Table 2.1 provides a summary of roadway characteristics for the SR 101 study area.

Table 2.1 Summary of Roadway Characteristics

(Dearborn, Jefferson, Ohio, Ripley, and Switzerland Counties in Indiana Plus U.S. 42 and KY 35 in Kentucky)

Route	Segment	Functional Class	No. of Lanes	Pavement	Shoulders*	1998 AADT	Curves per Mile**	Comments
U.S. 50	U.S. 421 at Versailles to SR 101	Principal Arterial	2	24'	4'	6,900	55mph-40mph: 0.14	2 to 3 lanes
	SR 101 to Lawrenceburg	Principal Arterial	4	2 @ 24' median divided	0' to 4'	6,120 to 34,059	55mph-40mph: 0.05 40mph-20mph: 0	Aurora to Lawrenceburg has 4 lanes with center turn lane
	Lawrenceburg to U.S. 50/I-275 Connector	Principal Arterial	6	2 @ 36'	0	37,514	55mph-40mph: 0 40mph-20mph: 0	6-lane with continuous center turn lane
	U.S. 50/I-275 Connector to Ohio State Line	Principal Arterial	4	2 at 24' median divided	0	12,271	55mph-40mph: 0 40mph-20mph: 0	
U.S. 421	SR 56 at Madison to SR 62	Principal Arterial	4	2 at 24' divided	4' to 7'	13,680 to 9,160	55mph-40mph: 0	
	SR 62 to U.S. 50 at Versailles	Principal Arterial	2	24'	0' to 3'	2,330 to 16,260	55mph-40mph: 0.11 40mph-20mph: 0.04	
	U.S. 50 at Versailles to I-74	Principal Arterial	2	22' to 24'	2' to 4'	4,950 to 8,770	55mph-40mph: 0.11 40mph-20mph: 0.04	
SR 56	U.S. 421 at Madison to SR 156 at Vevay	Minor Arterial	2	20' to 22'	0' to 3'	4,700 to 6,313	55mph-40mph: 0.38 40mph-20mph: 0	Rolling pavement, winding roadway
	SR 156 at Vevay to SR 250 at E. Enterprise	Major Collector	2	19' to 20'	None	3,467 to 2,168	55mph-40mph: 0.69 40mph-20mph: 0.65	Dangerous Curves near Vevay
	SR 250 at E. Enterprise to Aberdeen	Major Collector	2	20'	None	1,998	55mph-40mph: 1.04 40mph-20mph: 1.09	Right-of-way is tight through East Enterprise
	Aberdeen to SR 156	Major Collector	2	19'	None	1,369	55mph-40mph: 1.04 40mph-20mph: 1.09	3 lanes at east end, rolling with many curves
	SR 156 to SR 262 at Rising Sun	Minor Arterial	2	20' to 24'	2' to 3'	4,366 to 10,658	55mph-40mph: 1.04 40mph-20mph: 1.09	Scenic Route
	SR 262 at Rising Sun to U.S. 50 at Aurora	Minor Arterial	2	22' to 24'	2' paved	8,093 to 12,690	55mph-40mph: 0.91 40mph-20mph: 1.05	Scenic Route
SR 62	SR 129 to U.S. 50 at Dillsboro (Chief White Eye Trail)	Major Collector	2	18' to 22'	None	450 to 2,707	55mph-40mph: 1.54 40mph-20mph: 1.76	Sharp curves, hills, trucks cannot use
SR 101	U.S. 42 over Markland Dam to SR 156	Minor Arterial	2	Wide 2-lane	Yes	2,000	N/A	Good condition
	U.S. 50 to I-74	Major Collector	2	24'	0' to 1'	2,190 to 6,080	40mph-20mph: 0.21	

Notes: * Shoulders may be paved, gravel, earth or combination thereof.
** Pavement Management System: 1994 Horizontal Curvature Data; INDOT, Division of Roadway Management.

Table 2.1 Summary of Roadway Characteristics (continued)

(Dearborn, Jefferson, Ohio, Ripley, and Switzerland Counties in Indiana Plus U.S. 42 and KY 35 in Kentucky)

Route	Segment	Functional Class	No. of Lanes	Pavement	Shoulders*	1998 AADT	Curves per Mile**	Comments
SR 129	SR 56 to SR 250	Major Collector	2	18'	None	1,329	55mph-40mph: 1.51 40mph-20mph: 0.58	Under design Reconstruction: 2003
	SR 250 to U.S. 421	Major Collector	2	24'	2' paved + 3' gravel	1,249 to 3,720	N/A	New section level
	U.S. 50 to SR 46	Minor Arterial	2	24'	11'	2,860 to 7,120	N/A	
SR 156	SR 56 at Vevay to SR 101 at Markland Dam	Minor Arterial	2	22'	2' to 3'	7,203 to 3,329	55mph-40mph: 0.38 40mph-20mph: 0	Rolling pavement, scenic route
	SR 101 at Markland Dam to SR 250 at Patriot	Minor Arterial	2	22'	1' to 3'	1,173 to 2,188	55mph-40mph: 0.38 40mph-20mph: 0	Rolling, winding, scenic route
	SR 250 at Patriot to SR 56 (Ohio Co.)	Minor Arterial	2	22'	1' to 4'	1,717 to 3,288	55mph-40mph: 0.38 40mph-20mph: 0	Scenic Route
SR 250	SR 129 to SR 56	Major Collector	2	18'	0' to 1'	699 to 1,219	N/A	Rolling, Amish signs from Fairview to Pleasant
	SR 56 to SR 156	Major Collector	2	18'	1'	1,469 to 599	N/A	
SR 262	U.S. 50 to SR 56 at Rising Sun	Major Collector	2	18' to 22'	0' to 1'	3,526 to 4,845	N/A	
U.S. 42	U.S. 421 to Gallatin Co. Line	Major Collector	2	20' to 22'	1'	2,583 to 9,008	N/A	
	Gallatin Co. Line to KY 35	Major Collector	2	24'	1' to 8'	4,293	N/A	
	KY 35 to I-71/75	Major Collector	2	20' to 22'	1' to 4'	3,406 to 5,532	N/A	
KY 35	I-71 to U.S. 42	Major Collector	2	20' to 22'	1' to 2'	1,615 to 3,133	N/A	

Source: Bernardin, Lochmueller & Associates, Inc. from INDOT and Kentucky Transportation Cabinet data; and Dyer Environmental Services.

Notes: * Shoulders may be paved, gravel, earth or combination thereof.
** Pavement Management System: 1994 Horizontal Curvature Data; INDOT, Division of Roadway Management.

2.1.2 Traffic Volumes – Existing and Future[2]

Existing Conditions

Table 2.2 and Figure 2.1 show the 1998 daily traffic volumes on the major roadways and the estimated volume-to-capacity ratio (v/c) derived from the regional travel demand model. Analysis indicates that about 90 percent of the roadway miles in the study area carry less than 10,000 vehicles per day (vpd). The highest daily volumes, greater than 25,000 vpd, are along sections of I-74 at the northern boundary of the study area and I-275 east of Lawrenceburg near the Ohio and Kentucky state borders. These sections represent two percent of the study area roadways and, because they are located at or near the study area boundaries, are not a major influence on the travel patterns within the interior of the study area.

The volume-to-capacity (v/c) ratio is an indicator of the quality of traffic flow along a roadway. The volume-to-capacity (v/c) ratio compares the actual volume to maximum volume (capacity) that could pass a point over time. The more congested the roadway, the closer the v/c ratio is to 1.0. Based on output from the model for the study area, about 95 percent of the roadway miles within the study area are currently operating with a peak period v/c ratio of 0.60 or lower, indicating few traffic congestion issues. The roadway sections which have a v/c ratio greater than 0.60 are located within more densely developed areas of Lawrenceburg, Madison, and Versailles.

On average, truck volumes within the region represent about five to 10 percent of the overall traffic flow. Higher truck percentages, closer to 15 percent, occur in Lawrenceburg and Madison. The highest truck volumes in the region occur along I-74, with truck percentages of 15 to 20 percent. These truck percentages are considered standard for these types of roadways and the volume of truck movements within the study area have not been identified as a concern. Slow moving trucks can be a significant traffic issue, however, when they travel at reduced speeds along two-lane roads and prevent other traffic from traveling at desired speeds.

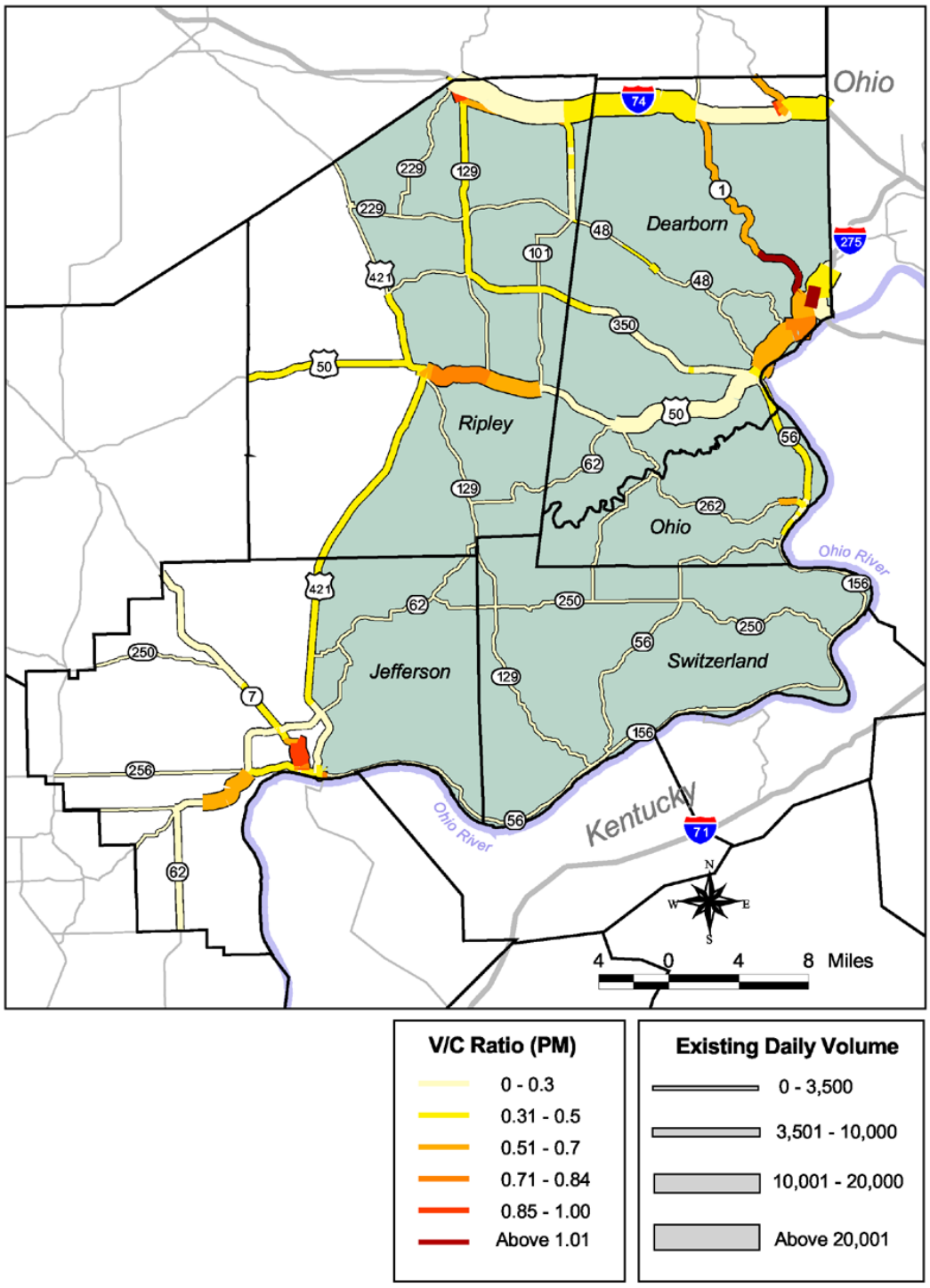
[2] Detailed information on traffic volumes can be found in the Existing Conditions Report, cited previously.

Table 2.2 Existing (1998) Roadway Volumes

Major Roadway	Year 1998 Daily Volumes	Year 1998 P.M. Period V/C
I-74		
Between Batesville and Ohio state border	19,000 – 25,000	0.20 – 0.35
I-275		
East of Lawrenceburg, near Ohio border	18,000 – 33,000	0.30 – 0.50
U.S. 50		
Between Ripley/Jennings County Line and Versailles	7,000 – 9,000	0.25 – 0.50
Between Versailles and Aurora	7,000 – 14,000	0.10 – 0.70
Between Aurora and Lawrenceburg	33,000	0.60 – 0.80
U.S. 421		
Between Madison and Versailles	4,000 – 5,000	0.15 – 0.40
Between Versailles and Greensburg	4,000 – 6,000	0.15 – 0.35
SR 129		
Between Vevay and U.S. 50	500 – 1,000	0.05 – 0.20
Between U.S. 50 and SR 46	2,000 – 7,000	0.10 – 0.35
SR 56		
Between Madison and Vevay	2,000 – 4,000	0.10 – 0.20
Between Vevay and U.S. 156 south of Rising Sun	500 – 1,500	0.05 – 0.30
Between Rising Sun and Aurora	5,000 – 7,000	0.25 – 0.40
SR 62		
Between Madison and SR 129	100 – 500	0.05 – 0.15
Between SR 129 and Dillsboro	500	0.05 – 0.15

Source: Cambridge Systematics, Inc. SR 101 Regional Travel Demand Model.

Figure 2.1 Existing Traffic Volume and V/C Ratio



Future Conditions

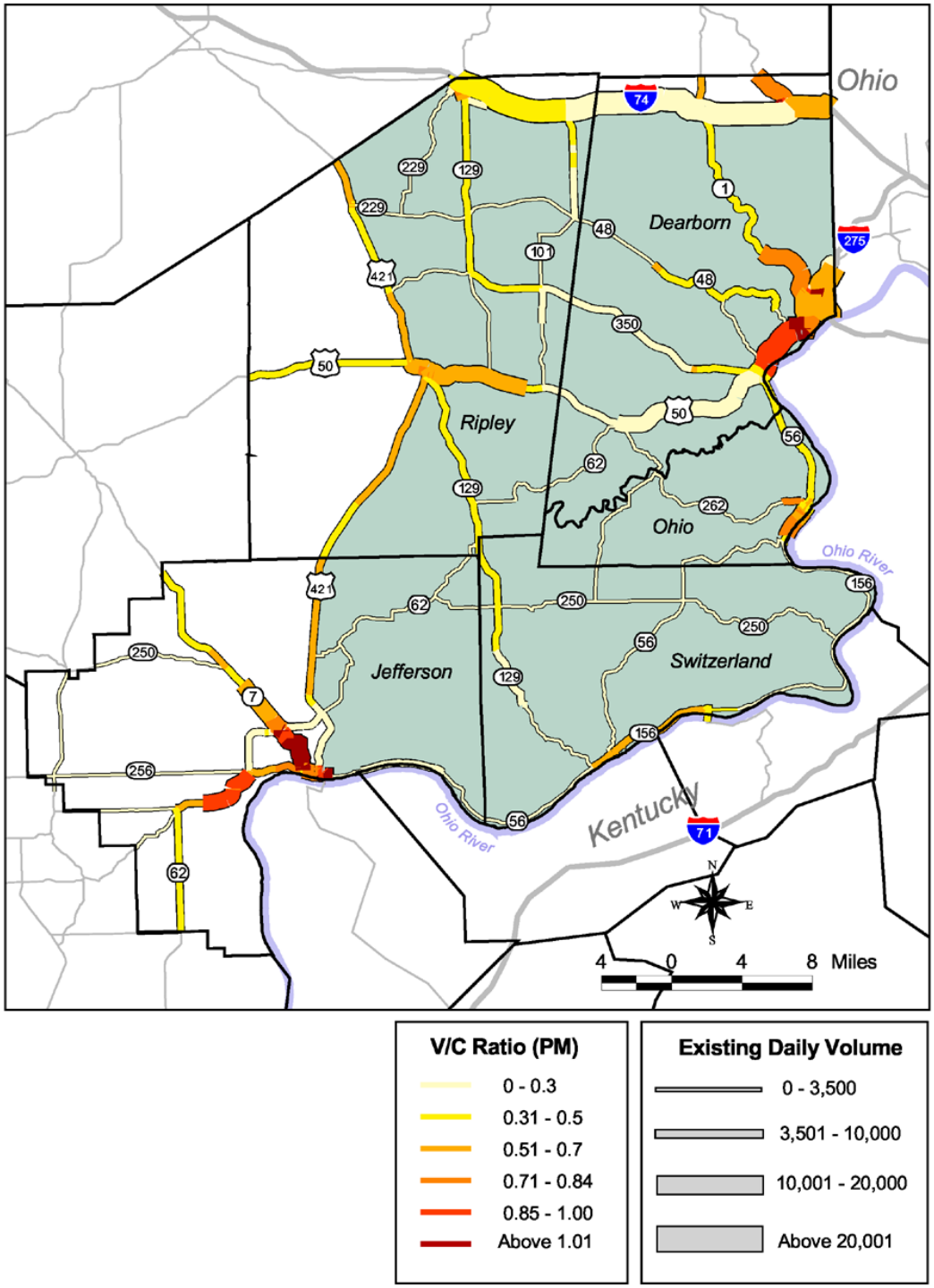
As summarized in Table 2.3 and Figure 2.2, all roadways will experience some increase in daily traffic volumes over the next 25 years. Within the SR 101 study area, daily vehicle miles of travel (VMT) are projected to grow 28 percent between 1998 and 2025. However, about 93 percent of roadway miles will continue to experience a v/c ratio less than 0.60, indicating no emerging congestion problems. As is the case under existing conditions, some roadways in the vicinity of Lawrenceburg, Madison, and Versailles will continue to experience v/c rates over 0.60, indicating some localized congestion concerns.

Table 2.3 Future (2025) Roadway Volumes

Major Roadway	Year 2025 Daily Volumes	Year 2025 P.M. Period V/C
I-74		
Between Greensburg and the Ohio state border	25,000 – 30,000	0.25 – 0.35
I-275		
East of Lawrenceburg, near Ohio border	28,000 – 45,000	0.55 – 0.70
U.S. 50		
Between Ripley/Jennings County Line and Versailles	7,000 – 10,000	0.30 – 0.50
Between Versailles and Aurora	7,000 – 16,000	0.15 – 0.70
Between Aurora and Lawrenceburg	45,000	0.80 – 0.90
U.S. 421		
Between Madison and Versailles	5,000 – 6,000	0.15 – 0.55
Between Versailles and Greensburg	7,000 – 10,000	0.40 – 0.60
SR 129		
Between Vevay and U.S. 50	3,000 – 4,000	0.15 – 0.30
Between U.S. 50 and SR 46	3,000 – 7,000	0.15 – 0.50
SR 56		
Between Madison and Vevay	3,000 – 4,000	0.15 – 0.20
Between Vevay and U.S. 156 south of Rising Sun	2,000 – 4,000	0.10 – 0.60
Between Rising Sun and Aurora	7,000 – 10,000	0.25 - 0.45
SR 62		
Between Madison and SR 129	500 – 1,000	0.05 – 0.15
Between SR 129 and Dillsboro	500	0.05 – 0.15

Source: Cambridge Systematics, Inc. SR 101 Regional Travel Demand Model.

Figure 2.2 Forecasted 2025 Traffic Volume and V/C Ratio



Based on the travel model forecasts for the region, truck percentages on most roadways will generally remain in the five to 10 percent range. Along U.S. 50 in Ripley and Dearborn counties, truck percentages will increase from 10 percent under current conditions to 15 percent in the future. Rates of 15 percent will continue to occur in Lawrenceburg and Madison. Along I-74, trucks are expected to represent 20 to 25 percent of the traffic flow.

2.1.3 Planned Improvements[3]

Various roadway improvements are currently in progress or are scheduled for future completion that will benefit travel conditions within the SR 101 corridor study area. In response to the recommendations of the 1990 SR 101/SR 129 Corridor Study discussed in Section 2.3, reconstruction of SR 129 from SR 250 south to SR 56 near Vevay is programmed for the 2003 construction year (INDOT project designation #9802690). This work will include improved vertical and horizontal alignments as well as widened lanes and shoulders. This reconstruction, which will include removal of tighter curves and shoulder widening, will facilitate safer roadway operations within the near future. (SR 129 from SR 250 to U.S. 421 was resurfaced in 2000.)

Additional programmed improvements of specific relevance to the SR 101 corridor include:

- SR 48 in Dearborn County (from Wilson Creek Road to U.S. 50) – Additional travel lanes scheduled for 2001 (INDOT project designation #8910926; #941092W; and, #9600920);

- SR 1 in Dearborn County (from U.S. 50 to SR 46) – Roadway reconstruction scheduled for 2006 (INDOT project designation #9804710);

- SR 56 in Jefferson County (from U.S. 421 to SR 129 in Vevay) – Roadway reconstruction scheduled for 2005 (INDOT project designation #0014680); and

- SR 56 in Ohio and Dearborn Counties (from Rising Sun to Aurora) – Roadway reconstruction scheduled for 2004 (INDOT project designation #9902520).

[3] Detailed information on planned improvements can be found in the Existing Conditions Report, cited previously.

In addition to these programmed improvements, there is one significant "planned" project within the study area, meaning that there is no established construction letting date at the present time. This project involves reconstruction of U.S. 50 in Ripley and Jennings Counties from North Vernon to SR 101 in Ripley County.

2.2 Socioeconomic Conditions

2.2.1 Overview

The SR 101 study area is predominantly rural with only a few areas of concentrated development, including Versailles, Lawrenceburg and Aurora, and Madison. For the most part, development is sparse and recent growth in employment opportunities has been limited to jobs in the Service Sector generated by the development of gambling casinos and their adjacent hotels. The future of the region's economy has been a concern expressed by many local citizens, public officials, and business leaders. Accessibility is seen by these individuals as a key consideration in the enhancement of economic opportunities and encouragement of new development.

The Service Industry, which includes casino and hotel employment, was the primary employment sector for all study area counties in 1998 with the exception of Ripley and Switzerland. Only Ripley County had a dominant share of employment (31.2 percent) in the manufacturing sector. Switzerland County's dominant employment sector was Farming and Agricultural Services (26.4 percent), although employment in this sector is frequently supported by a second source of income. Employment projections for 2025 indicate that the Service Sector share of employment in all study area counties will continue to grow. While 26.1 percent of 1998 study area employment was in Services, this sector's share of employment is projected to increase to 34.1 percent in 2025; whereas the Agriculture Sector, particularly in Switzerland County, and Manufacturing Sector are projected to decline in regional share. In terms of per capita income, the SR 101 study area lags significantly behind the state of Indiana as a whole. In 1998, the average per capita income of the five-county study area was $18,600, approximately 13.5 percent below the statewide average. This disparity is projected to increase in 2025 to be 16.6 percent below the statewide average.

Corroborating the issue of economic development in Southeastern Indiana is the recent United States Department of Agriculture's annual Strategic

Plan for rural development in Indiana.[4] The USDA identified certain rural counties in Indiana as "stressed," meaning that the area was having difficulty in being "successful and sustainable." Eleven factors were used in this evaluation, including housing-related infrastructure, population change, household income, employment, healthcare, and business growth. Out of 92 Indiana counties, Switzerland County ranked as the fourth most stressed. Of the 11 ranking factors, Switzerland County was among the top 20 highest need counties for five factors and the top 10 highest need counties for three factors, including persons living in poverty.

2.2.2 Socioeconomic Profile

Study Area Summary. Among the 92 counties in Indiana, four out of the five counties in the study area fall below the median county population. Ohio and Switzerland are ranked among the four counties with the smallest population in Indiana. From the year 1970 through the year 2000 to the year 2025, the study area population has been and is forecasted to grow at a faster pace than the state of Indiana (see Table 2.4). However, Jefferson and Ripley Counties fell below the statewide population growth rate over the past two decades; and Ohio County also fell below the statewide population growth rate this past decade.

[4] USDA Rural Development Strategic Plan for Indiana, Revised January, 2001.

Table 2.4 Existing and Forecasted Population

Year	Dearborn	Jefferson	Ohio	Ripley	Switzerland	Study Area	Indiana
Existing and Forecasted Population							
1970	29,430	27,006	4,289	21,138	6,306	88,169	5,195,392
1980	34,291	30,419	5,114	24,398	7,153	101,375	5,490,120
1990	38,835	29,797	5,315	24,616	7,738	106,301	5,544,159
2000	46,109	31,705	5,623	26,523	9,065	119,025	6,080,485
2025	68,520	37,680	7,280	34,840	11,470	159,790	7,012,000
Compound Annual Growth Rate of Population Change in Percent							
1970-1980	1.54%	1.20%	1.77%	1.44%	1.27%	1.41%	0.55%
1980-1990	1.25%	-0.21%	0.39%	0.09%	0.79%	0.48%	0.10%
1990-2000	1.73%	0.62%	0.56%	0.75%	1.60%	1.14%	0.93%
2000-2025	1.60%	0.69%	1.04%	1.10%	0.95%	1.19%	0.57%

Sources: Decennial population from U.S. Census. Forecasts from *2000 Complete Economic and Demographic Data Source*, Woods & Poole Economics, Inc., 2000.

From the year 1970 through the year 2000, the income per capita in the study area was 85 to 87 percent of that Statewide, but the study area is forecasted to lose ground to 83 percent of the statewide income per capita over the next 25 years (see Table 2.5). Dearborn and Ripley Counties have maintained per capita income levels above the statewide median, but the other three study area counties have consistently fallen below the median statewide per capita income. In particular, Switzerland County has the lowest income per capita in the study area, and has been among the bottom four counties statewide for the past 30 years.

Table 2.5 Existing and Forecasted Income Per Capita

Year	Dearborn	Jefferson	Ohio	Ripley	Switzerland	Study Area	Indiana
Existing (1970 to 1998) and Forecasted (2000 and 2025) Income Per Capita(in 1992 dollars)							
1970	$11,698	$10,787	$10,338	$11,591	$9,298	$11,155	$12,859
1980	$14,790	$12,978	$13,397	$13,482	$10,637	$13,569	$15,940
1990	$17,044	$14,702	$14,369	$17,035	$12,161	$15,898	$18,477
1997	$18,822	$16,451	$17,886	$20,611	$14,277	$18,232	$20,751
1998	$19,083	$16,816	$17,894	$21,475	$13,991	$18,600	$21,481
2000	$19,624	$17,301	$18,301	$22,452	$14,340	$19,170	$22,232
2025	$24,645	$23,087	$22,258	$29,671	$17,860	$24,778	$29,724
Compound Annual Growth Rate of Change in Percent							
1970-1980	2.37%	1.87%	2.63%	1.52%	1.35%	1.98%	2.17%
1980-1990	1.43%	1.26%	0.70%	2.37%	1.35%	1.60%	1.49%
1990-2000	1.42%	1.64%	2.45%	2.80%	1.66%	1.89%	1.87%
2000-2025	0.92%	1.16%	0.79%	1.12%	0.88%	1.03%	1.17%

Sources: *2000 State Profile: Indiana*; Woods & Poole Economics, Inc.; 2000.

The Study Area employment growth rate was greater than the statewide growth rate in the 1970s and 1990s, and is forecasted to grow at a faster pace than the state of Indiana over the next 25 years (see Table 2.6). However, Switzerland County has shown the slowest employment growth rate in the Study Area for the past 30 years, and has fallen consistently below the statewide growth rate. Until the Grand Victoria Casino opened in Ohio County in 1996, Ohio County had experienced an even slower employment growth rate than Switzerland County. (It should be noted that the Belterra Casino opened in October of 2000 in Switzerland County, and the economic impact is not reflected in the year 2000 employment numbers nor the year 2025 forecast. Therefore, the year 2025 employment forecast may be nearly 1,500 higher when Belterra Casino jobs are added.)

Table 2.6 Existing and Forecasted Employment

Year	Dearborn	Jefferson	Ohio	Ripley	Switzerland	Study Area	Indiana
Existing and Forecasted Employment (total full and part-time employment)							
1970	10,919	12,658	1,102	9,047	2,275	36,001	2,290,879
1980	12,801	14,463	1,183	11,042	2,563	42,052	2,632,230
1989	13,958	15,719	1,289	13,696	2,777	47,439	3,030,705
1990	13,965	16,147	1,238	14,172	2,794	48,316	3,091,025
1998	19,274	17,435	2,979	16,176	2,951	58,815	3,579,846
1999	19,652	17,599	2,923	16,605	3,005	59,784	3,645,725
2000	19,540	18,280	3,080	17,130	3,110*	61,140	3,719,540
2025	28,430	22,710	4,660	22,020	3,620*	81,440	4,839,800
Compound Annual Growth Rate of Change in Percent							
1970-1980	1.60%	1.34%	0.71%	2.01%	1.20%	1.57%	1.40%
1980-1990	0.87%	1.11%	0.46%	2.53%	0.87%	1.40%	1.62%
1989-1999	3.48%	1.14%	8.53%	1.94%	0.79%	2.34%	1.86%
1990-2000	3.42%	1.25%	9.54%	1.91%	1.08%*	2.38%	1.87%
2000-2025	1.51%	0.87%	1.67%	1.01%	0.61%*	1.15%	1.06%

Sources: Existing employment from *Regional Economic Information System*, U.S. Bureau of Economic Analysis, May 3, 2001. Forecasts for 2000 and 2025 from *2000 Complete Economic and Demographic Data Source*, Woods & Poole Economics, Inc., 2000.

Note: * Does not include Belterra Casino (see text).

Dearborn County. Covering a land area of 305 square miles, Dearborn County had a population of 46,109 in the year 2000 (up from 38,835 persons in 1990).[5] The growth rate at 18.7 percent over the past decade exceeded the statewide growth rate of 9.7 percent, and placed Dearborn County as the 12th fastest growing county in Indiana. The largest communities in Dearborn County are Lawrenceburg, home to the Argosy Casino (opened in December 1996), with a population of 4,685 persons in 2000 (up from 4,566 persons in 1990), Greendale with 4,296 persons in 2000 (down from 4,435 persons in 1990) and Aurora with 3,965 persons in 2000 (up from 3,909 persons in 1990).[6] Dearborn County is part of the

[5] *2000 Census*; U.S. Census Bureau; March 9, 2001.

[6] *2000 Census*; U.S. Census Bureau; March 9, 2001.

Cincinnati Metropolitan Area. The 1998 per capita income at $19,083 (in 1992 dollars) was 89 percent of the statewide per capita income of $21,481.[7]

Employment (wage and salary plus sole proprietorships) in Dearborn County increased from 13,958 jobs in 1989 to 19,652 jobs in 1999 (19,274 jobs in 1998), an annual compound growth rate of 3.5 percent exceeding the statewide annual compound growth rate of 1.9 percent. Reflecting the opening of the Argosy Casino, the major employment sector in Dearborn County was Services with 6,134 jobs in 1999 (up from 5,837 jobs in 1998 and 2,823 jobs in 1989), followed by Retail Trade with 3,491 jobs in 1999 (up from 3,489 jobs in 1998 and 2,628 jobs in 1989) and Government with 2,353 jobs in 1999 (up from 2,298 jobs in 1998 and 1,959 jobs in 1989). Of the employment sectors that accounted for at least five percent of earnings in 1999, the slowest earnings growth from 1989 to 1999 was Nondurable Goods Manufacturing, and the fastest earnings growth was Services.[8]

Jefferson County. Jefferson County covers 361 square miles and had a population of 31,705 in the year 2000 (up from 29,797 persons in 1990). The growth rate at 6.4 percent over the past decade fell below the statewide growth rate. The largest communities in Jefferson County are Madison with a 2000 population of 12,004 persons (down from 12,214 persons in 1990) and Hanover with 2,834 persons in 2000 (down from 3,608 persons in 1990). The 1998 per capita income at $16,816 (in 1992 dollars) was 78 percent of that statewide and ranked 76th among the counties.

Employment (wage and salary plus sole proprietorships) in Jefferson County increased from 15,719 jobs in 1989 to 17,599 jobs in 1999 (17,435 jobs in 1998), an annual compound growth rate of 1.1 percent falling below the statewide annual compound growth rate of 1.9 percent. The major employment sector in Jefferson County was Services with 4,450 jobs in 1999 (up from 4,413 jobs in 1998 and 3,383 jobs in 1989), followed by Manufacturing with 3,580 jobs in 1999 (up from 3,528 jobs in 1998, but down from 3,929 jobs in 1989) and Retail Trade with 3,432 jobs in 1999 (down from 3,489 jobs in 1998, but up from 2,628 jobs in 1989). Of the employment sectors that accounted for at least five percent of earnings in 1999, the slowest earnings growth from 1989 to 1999 was Transportation/ Public Utilities and the fastest growing was Construction.

Ohio County. Ohio County had a population of 5,623 in the year 2000 (up from 5,315 persons in 1990) and covers 87 square miles. The decennial growth rate of 5.8 percent placed Ohio County below the statewide growth rate. Ohio County is also part of the Cincinnati Metropolitan Area. The

---

[7] *2000 State Profile: Indiana*; Woods & Poole Economics, Inc., 2000.

[8] *Regional Fact Sheet*; U.S. Bureau of Economic Analysis; May 3, 2001.

largest community in Ohio County is Rising Sun, home of the Grand Victoria Casino (opened in October 1996), with a population of 2,470 persons in 2000 (down from 2,479 persons in 1990). The 1998 per capita income at $17,894 (in 1992 dollars) was 83 percent of that statewide.

Employment (wage and salary plus sole proprietorships) in Ohio County increased from 1,289 jobs in 1989 to 2,923 jobs in 1999 (2,979 jobs in 1998), an annual compound growth rate of 8.5 percent exceeding the statewide annual compound growth rate of 1.9 percent. The opening of the Grand Victoria Casino in Rising Sun resulted in a major job increase in 1996 in the Services Sector. Thus, the major employment sector in Ohio County was Services with an estimated 1,664 jobs in 1999 (up from 243 jobs in 1989), followed by Government with 331 jobs in 1999 (up from 329 jobs in 1998 and 219 jobs in 1989) and Retail Trade with 271 jobs in 1999 (up from 215 jobs in 1998 and 197 jobs in 1989). Of the employment sectors that accounted for at least five percent of earnings in 1999, the slowest earnings growth from 1989 to 1999 was Government, and the fastest earnings growth was Services.

Ripley County. Covering a land area of 446 square miles, Ripley County had a population of 26,523 in the year 2000 (up from 24,616 persons in 1990). The growth rate of 7.7 percent placed Ripley County slightly below the statewide average. The largest communities in Ripley County are Batesville with a population of 6,033 persons in 2000 (up from 4,947 persons in 1990), Osgood with 1,669 persons in 2000 (up from 1,656 persons in 1990), and Versailles with 1,784 persons in 2000 (up from 1,707 persons in 1990). The 1998 per capita income at $21,475 (in 1992 dollars) was equal to that Statewide.

Employment (wage and salary plus sole proprietorships) in Ripley County increased from 13,696 jobs in 1989 to 16,505 jobs in 1999 (16,176 jobs in 1998), an annual compound growth rate of 1.9 percent equal to that statewide. The largest employment sector in Ripley County was Manufacturing with 5,452 jobs in 1999 (up from 5,252 jobs in 1998 and 4,567 jobs in 1989), followed by Services with 2,922 jobs in 1999 (down from 2,944 jobs in 1998, but up from 2,318 jobs in 1989) and Retail Trade with 2,470 jobs in 1999 (up from 2,410 jobs in 1998 and 2,054 jobs in 1989). Of the employment sectors that accounted for at least five percent of earnings in 1999, the slowest earnings growth from 1989 to 1999 was Retail Trade and the fastest earnings growth was Finance/Insurance/Real Estate.

Switzerland County. Switzerland County had a population of 9,065 in the year 2000 (up from 7,738 persons in 1990) and covers a land area of 221 square miles. The decennial growth rate of 17.1 percent placed the county 14th among the fastest growing counties statewide. The largest community in Switzerland County is Vevay, home of the Belterra Casino (opened in October 2000), with a population of 1,735 persons in 2000 (up from 1,588

persons in 1990). The 1998 per capita income at $13,991 (in 1992 dollars) was 65 percent of that statewide and ranked last among the 92 counties.

Employment (wage and salary plus sole proprietorships) in Ohio County increased from 2,777 jobs in 1989 to 3,005 jobs in 1999 (2,951 jobs in 1998), an annual compound growth rate of 0.8 percent significantly below the statewide annual compound growth rate of 1.9 percent. Even prior to the opening of Belterra Casino in October of 2000, the largest sector of employment in Switzerland County was Services with 554 jobs in 1999 (down from 562 jobs in 1998, but up from 400 jobs in 1989), followed by Government with 480 jobs in 1999 (up from 458 jobs in 1998 and 425 jobs in 1989) and Manufacturing with 453 jobs in 1999 (down from 470 jobs in 1998 and 584 jobs in 1989). Of the employment sectors that accounted for at least five percent of earnings in 1999, the slowest earnings growth from 1989 to 1999 was Durable Goods Manufacturing, and the fastest earnings growth was Transportation/Public Utilities.

Kentucky Counties. As a result of the bridges over the Ohio River at Madison, the Markland Dam, and Lawrenceburg, the five-county Study Area interacts with the northern Kentucky counties of Trimble, Carroll, Gallatin, and Boone.

Boone County. As home of the Greater Cincinnati International Airport, Boone County (KY) grew from 57,589 persons in the year 1990 to 85,991 persons in the year 2000, and had the second highest growth rate among the Kentucky counties over the past decade. Employment (wage and salary plus sole proprietorships) in Boone County increased from 42,777 jobs in 1989 to 77,172 jobs in 1999 (72,726 jobs in 1998), an annual compound growth rate of 6.1 percent significantly above the Kentucky Statewide annual compound growth rate of 2.1 percent. Services was the largest employment sector with 15,706 jobs in 1999 (up from 8,322 jobs in 1989), followed by Retail Trade with 14,776 jobs in 1999 (up from 9,633 jobs in 1989) and Transportation/Public Utilities with 13,785 jobs in 1999 (up from 5,960 jobs in 1989).

Carroll County. Near the Markland Dam, Carroll County (KY) is the home of Dow Corning, Gallatin Steel and North American Stainless. With a land area of 130 square miles, Carroll County grew only 9.3 percent over the past decade from 9,292 persons in the 1990 to 10,155 persons in the year 2000, slightly below the Kentucky statewide growth rate of 9.7 percent. The largest community in Carroll County is Carrollton with a population of 3,846 persons in the year 2000 (that has changed little over the past 30 years).

Employment (wage and salary plus sole proprietorships) in Carroll County increased from 5,635 jobs in 1989 to 6,997 jobs in 1999 (6,841 jobs in 1998), an annual compound growth rate of 2.2 percent comparable to the Kentucky Statewide rate of 2.1 percent. The major employment sector in

Carroll County was Manufacturing with 2,483 employees in 1999 (up from 1,016 jobs in 1998 and 679 jobs in 1989), followed by Services with 1,207 employees in 1999 and Retail Trade with 1,063 employees in 1999. Of the industries that accounted for at least five percent of the earnings in 1999, the slowest earnings growth was Government and the fastest earnings growth was Durable Goods Manufacturing.

Gallatin County. On the south end of the Markland Dam Bridge, Gallatin County is home of the Kentucky Speedway (which opened in 2000 with 66,000 seats and has plans for another 120,000 seats in the near future). Covering a land area of only 99 square miles, Gallatin County had the third highest growth rate among the Kentucky counties, growing from 5,393 persons in the year 1990 to 7,870 persons in the year 2000. The largest community in Gallatin County is Warsaw with a population of 1,811 persons in the year 2000 (up from 1,202 persons in the year 1990).

Employment (wage and salary plus sole proprietorships) in Gallatin County increased from 1,677 jobs in 1989 to 2,953 jobs in 1999 (2,773 jobs in 1998), an annual compound growth rate of 5.8 percent exceeding the Kentucky Statewide rate of 2.1 percent. The major employment sector in Gallatin County was Manufacturing with 756 employees in 1999 (up from 687 jobs in 1998 and only 117 jobs in 1989), followed by Services with 446 employees in 1999 (up from 410 jobs in 1998 and 210 jobs in 1989) and Government with 362 jobs in 1999 (up from 345 jobs in 1998 and 247 jobs in 1989). Of the industries that accounted for at least five percent of the earnings in 1999, the slowest earnings growth was Retail Trade, and the fastest earnings growth was Durable Goods Manufacturing.

Trimble County. Across the Ohio River from Madison, Trimble County ranked 8th in the percent of decennial growth among the 120 Kentucky counties, increasing from 6,090 persons in the year 1990 to 8,125 persons in the year 2000. Employment (wage and salary plus sole proprietorships) in Trimble County dropped dramatically from 2,898 jobs in 1989 to 2,272 jobs in 1999 (2,238 jobs in 1998). In 1999, the greatest number of people were employed on the farm (725 jobs) although nonfarm employment accounted for 1,547 jobs (Services being the largest sector with 439 jobs).

■ 2.3 1990 SR 101/SR 129 Corridor Study

In October 1990, the Indiana Department of Transportation (INDOT) conducted a roadway analysis to determine viable options for an improved north/south corridor from the SR 101 Markland Dam Bridge on the Ohio

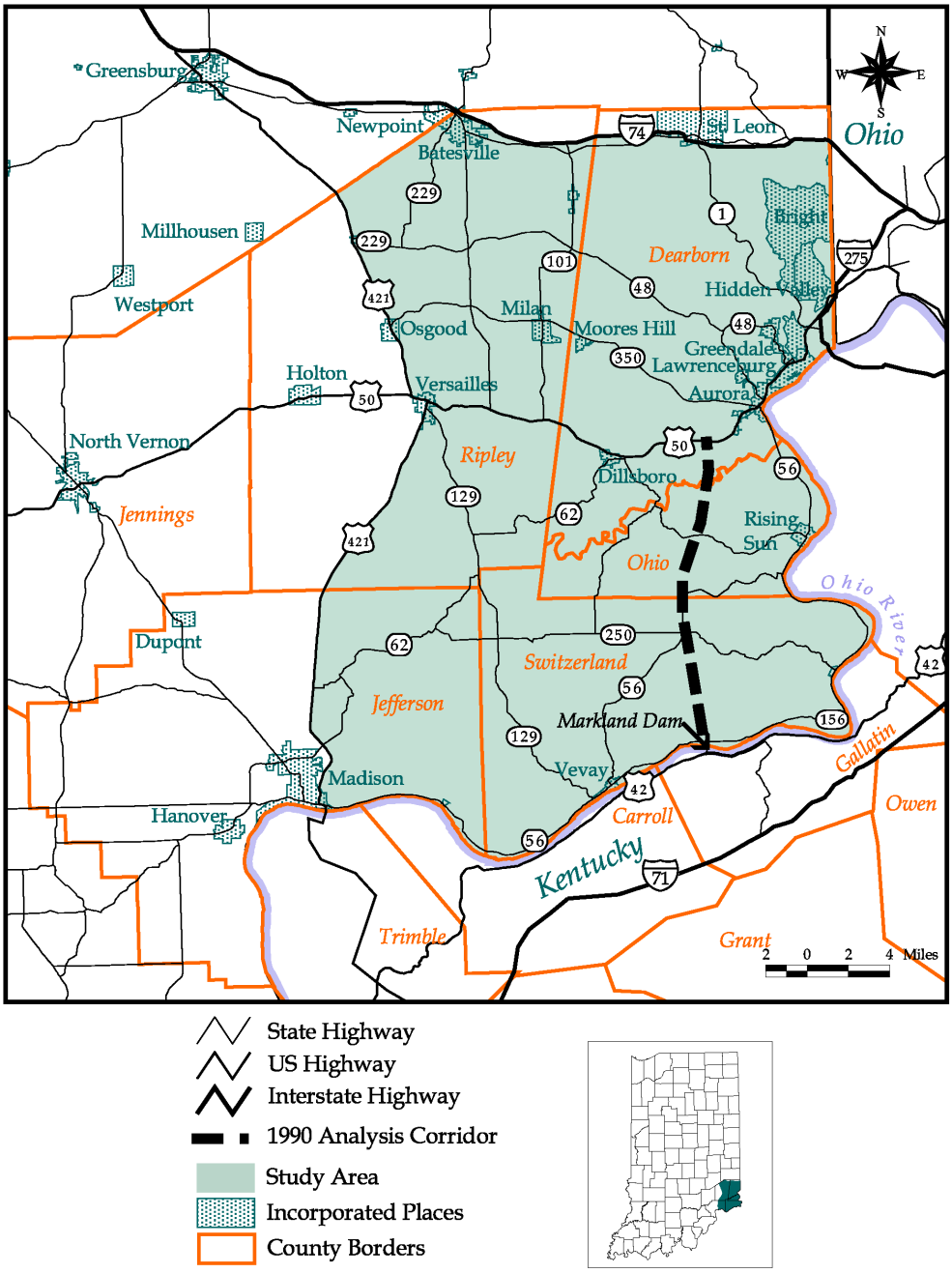
River to U.S. 50 in southeastern Indiana through Switzerland and Ohio Counties.[9] The analysis was performed at the request of INDOT's Seymour District Office in response to requests from various sources, including the County Commissioners of Switzerland and Ohio Counties and U.S. Representative Lee Hamilton.

Two improvement options were identified for analysis. One option was an 18-mile alignment for a "new" state road corridor that would utilize 2.5 miles of existing SR 56 and 15.5 miles of existing county road corridors to connect SR 101 at the Markland Dam Bridge north to U.S. 50 in the vicinity of U.S. 50 intersection with SR 101. Construction cost for this project was estimated between $42.5 million and $50.2 million. The alignment of the "new" corridor analyzed in this study is shown in Figure 2.3. The second option involved the reconstruction of SR 129 from SR 56 near Vevay to U.S. 421 south of Versailles. The analysis determined that due to the extremely hilly terrain within the area, several vertical and horizontal curves would need improvement. The cost of reconstructing the southern segment of the SR 129 corridor between SR 56 and SR 250 was estimated to be $12.4 million and the northern segment between SR 250 and U.S. 421 was estimated to be $3.7 million.

The analysis determined that a new roadway from Markland Dam to U.S. 50 was not as cost-effective as the reconstruction of SR 129. Given the amount of traffic which estimated at the time to utilize a new roadway, the $42.5 to $50.2 million cost of construction was comparatively high relative to similar projects. It was also determined that the level-of-service on existing SR 129 was acceptable due to low traffic volumes. However, it was also determined that a mobility problem was apparent on the southern segment of the SR 129 corridor due to geometric deficiencies that slowed traffic. The study concluded that reconstruction of the roadway would improve mobility by eliminating undesirable vertical and horizontal curves. Resurfacing of the northern segment of SR 129 (SR 250 to U.S. 421) was completed in 2000. Reconstruction of the southern segment (SR 250 to SR 56) is scheduled to begin in 2003. As indicated in Section 2.1.3, these improvements will contribute toward safer roadway operations on SR 129.

[9] Indiana Department of Transportation, Programming Section, "Roadway Analysis: SR 101 Road Construction from Markland to U.S. 50 and SR 129 Road Reconstruction from SR 56 to U.S. 421," October 1990.

Figure 2.3 1990 SR 101/SR 129 Study Analysis Corridor



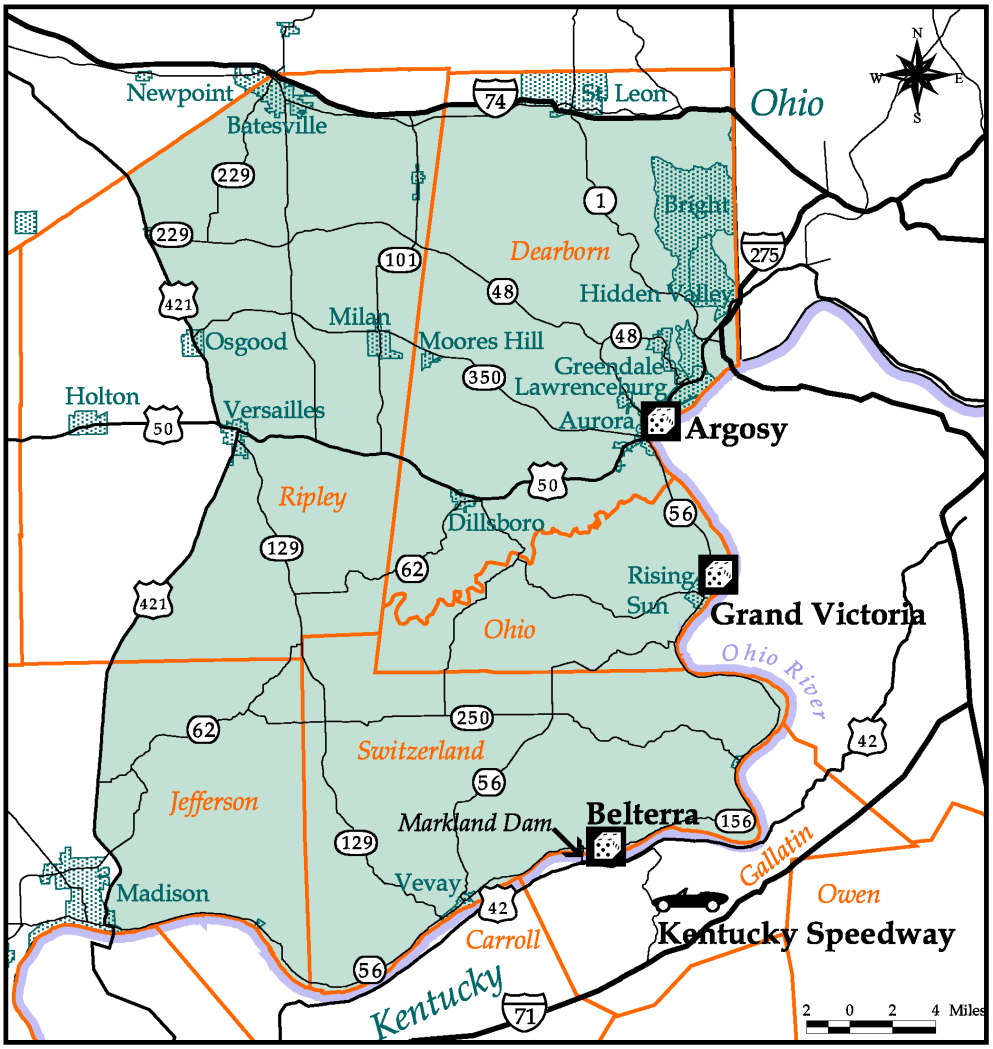
2.4 Casino Development

Since the completion of the 1990 SR 101 Corridor Study, the most significant change in the SR 101 study area affecting travel demand has been the development of three riverboat casinos on the Ohio River. The Indiana Riverboat Gambling Act, which became effective July 1, 1993, legalized casino gaming on riverboats. This legislation permitted the licensing of 11 riverboats, of which five were authorized for the Ohio River. As shown in Figure 2.4, three of these Ohio River riverboat casinos are located in the SR 101 study area. Both the Argosy Casino in Lawrenceburg and the Grand Victoria Casino in Rising Sun opened for business in 1996. The third casino, Belterra, opened near Vevay in 2000. Each of these facilities operates from 9:00 a.m. until the late evening-early morning hours, seven days a week. Each facility includes a hotel with 200 to 300 rooms. Both the Grand Victoria and Belterra also have 18-hole golf courses. In total, these three casinos and associated hotel and resort developments employ approximately 5,000 people, equal to about 20 percent of the total employment of Switzerland, Ohio, and Dearborn counties.

In 2000, admissions to the Argosy were 3.1 million and to the Grand Victoria were 1.4 million. The Belterra, which opened in October 2000, had 175,000 admissions for the remainder of 2000. It is estimated that the Argosy generates about 10,000 average daily vehicle trips (5,000 in and 5,000 out) and the Grand Victoria generates about 5,000 average daily vehicle trips (2,500 in and 2,500 out). Annual admission data is not yet available from the Belterra. Because it is similar in size to the Grand Victoria, it is estimated that the Belterra will generate a comparable number of trips as the Grand Victoria.

Patronage at these facilities is drawn from the region at-large, encompassing the metropolitan areas of Columbus, Cincinnati, Dayton, Louisville, and Indianapolis. For each of these facilities, accessibility was cited in interviews with casino operators as a critical concern, particularly in regard to the ability of these facilities to compete with facilities located closer to major urban areas with more direct highway access.

Figure 2.4 Location of Study Area Casinos and Kentucky Speedway



■ 2.5 Northern Kentucky Growth and KYTC Plans

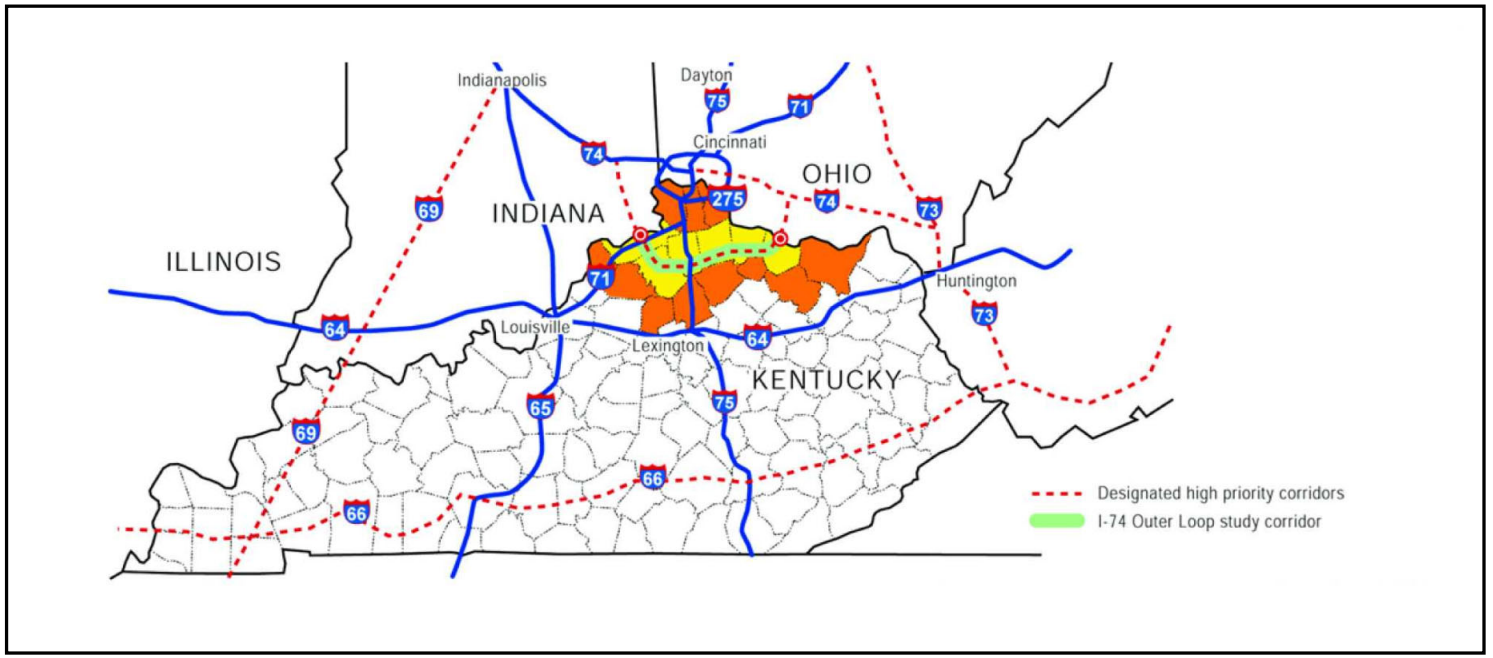
Further contributing to travel demand through the SR 101 study area is the economic development of Carroll and Gallatin Counties in northern Kentucky, directly south of the study area. The largest of these manufacturing facilities are located in Carroll County and include Gallatin Steel, Dow Corning, and North American Stainless. Since 1990, Carroll and Gallatin Counties have experienced a combined employment growth of 33 percent, as compared to 22 percent employment growth for the five

Indiana counties in the SR 101 study area. A substantial number of employees of facilities in northern Kentucky commute to work from southern Indiana.

Another traffic generator in northern Kentucky is the Kentucky Speedway in Sparta, Kentucky, near the Markland Dam and I-71 in Gallatin County as shown in Figure 2.4. This facility opened in 2000. In its current phase of development, the facility has 65,989 grandstand seats, additional luxury suites, and a 2,000-seat exterior club. Expansion of the facility in Phase II would involve the addition of a dirt track and drag-strip racing facilities with grandstand seating capacity of 120,000. The limited summer race schedule for 2001 included four weekends from June through August with multiple events each weekend, beginning on Friday through Saturday or Sunday. Also, large arena rock concerts are periodically held at the facility. As a result of its intermittent schedule of events, the facility is not a consistent trip generator. However, when in operation, the facility draws spectators from throughout a multi-state region.

Two projects are being undertaken by the Kentucky Transportation Cabinet (KYTC) which would facilitate access in Gallatin and Carroll Counties. The first involves the construction of a new roadway between I-71 to U.S. 42 in the vicinity of the Markland Dam. This project has advanced through the design stage and is currently under construction. This will be a two-lane facility providing a direct connection between I-71 and the Markland Dam with access to the Kentucky Speedway, as indicated in Figure 1.1. A second project, for which a conceptual feasibility study is currently being conducted, is a northern Kentucky outer loop which could involve an I-74 Bypass for a corridor across northern Kentucky from Markland Dam to the Maysville Dam east of Cincinnati. The proposed I-74 corridor, shown in Figure 2.5, will be approximately 80 miles long. (Locating the specific corridor is an initial element of the feasibility study's work plan.) This project was identified as a "high-priority project" in the Federal Transportation Equity Act for the 21st Century (TEA-21). By improving access into the vicinity of Markland Dam, both of these facilities have potential in increase travel demand in the SR 101 study area. As a result, coordination of activities on the various studies was established with the Kentucky Transportation Cabinet and has been maintained during the SR 101 corridor study.

Figure 2.5 Northern Kentucky Outer Loop Corridor



Source: Kentucky Transportation Cabinet.

3.0 Purpose and Need

The following section summarizes the key findings of the SR 101 Corridor Improvement Feasibility Study draft Statement of Purpose and Need, published in January 2002. The draft Statement of Purpose and Need discussed existing and future conditions in the study area, as described in Section 2.0 of this report, and identified the principle transportation needs of the SR 101 corridor. These transportation needs, improved roadway safety and regional accessibility, are discussed in the following sections.

3.1 Improve Roadway Safety

An analysis of accidents throughout the five-county study area was performed using INDOT accident data from 1996 to 1998. These data were used to assess personal injury and fatality rates within the study area compared to the state of Indiana as a whole. Tables 3.1 and 3.2 and Figures 3.1 and 3.2 summarize these accident statistics. Table 3.1 and Figure 3.1 provide statistics for all rural arterial roadways which have either an injury rate or fatality rate higher than the state average for comparable facilities. Table 3.2 and Figure 3.2 provide these statistics for rural collector roadways.

These statistics provide an indication of the specific problem roadways at the county level. For example, from 1996 to 1998, SR 56 in Switzerland County, a rural arterial roadway, had an injury rate of 187.8 and a fatality rate of 9.4 per 100 million annual vehicle miles of travel. In contrast, statewide, Indiana rural arterial roadways had an average injury rate of 50.4 and a fatality rate of 2.1. Thus, the injury and fatality rates on SR 56 in Switzerland County were 273 percent and 348 percent above the state average, respectively, for comparable roadways. Injury rates on rural collector roadways in the study area were also found to significantly exceed state averages. Statewide from 1996 to 1998, Indiana rural collector roadways had an average injury rate of 90.6 and a fatality rate of 1.3. SR 262 in Ohio County exceeded the state average injury rate for comparable roadways by 102 percent. SR 129 in Switzerland County exceeded the state average injury rate by 85 percent and the state average fatality rate by 362 percent. Excluding U.S. 421 in Jefferson and Ripley Counties and SR 156 in Switzerland County, all of the state rural arterial roadways in the Study area had higher injury rates than the state as a whole. Furthermore, all of

the rural arterial roadways in the study area had higher fatality rates than the statewide average, excluding U.S. 50 and SR 56 in Dearborn County, U.S. 421 in Jefferson and Ripley Counties, and SR 156 in Ohio County.

Table 3.3 summarizes injury and fatality rates on State Arterial and Collector Roadways by county. As indicated in the table, both Dearborn and Switzerland Counties had injury rates higher than the 1996 to 1998 state average, and all study area counties with the exception of Dearborn County had fatality rates equal to or higher than the state average. This problem is particularly evident in Switzerland County which had an injury rate 36 percent higher and a fatality rate 335 percent higher than the state average.

Figure 3.1 Injury and Fatality Rates for Rural Arterial Roadways
Rate(s) Above State Average

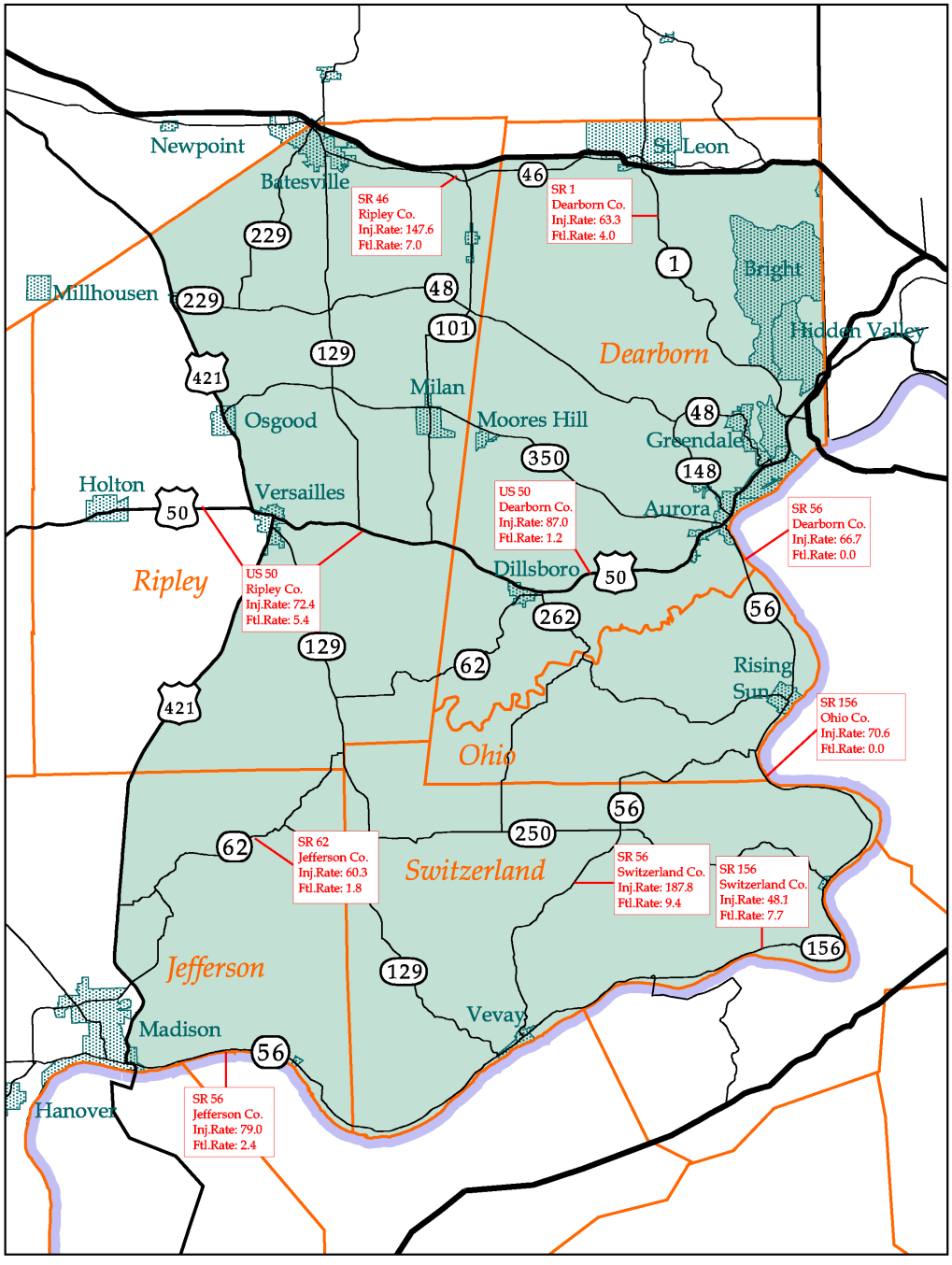


Figure 3.2 Injury and Fatality Rates for Rural Collector Roadways
Rate(s) Above State Average

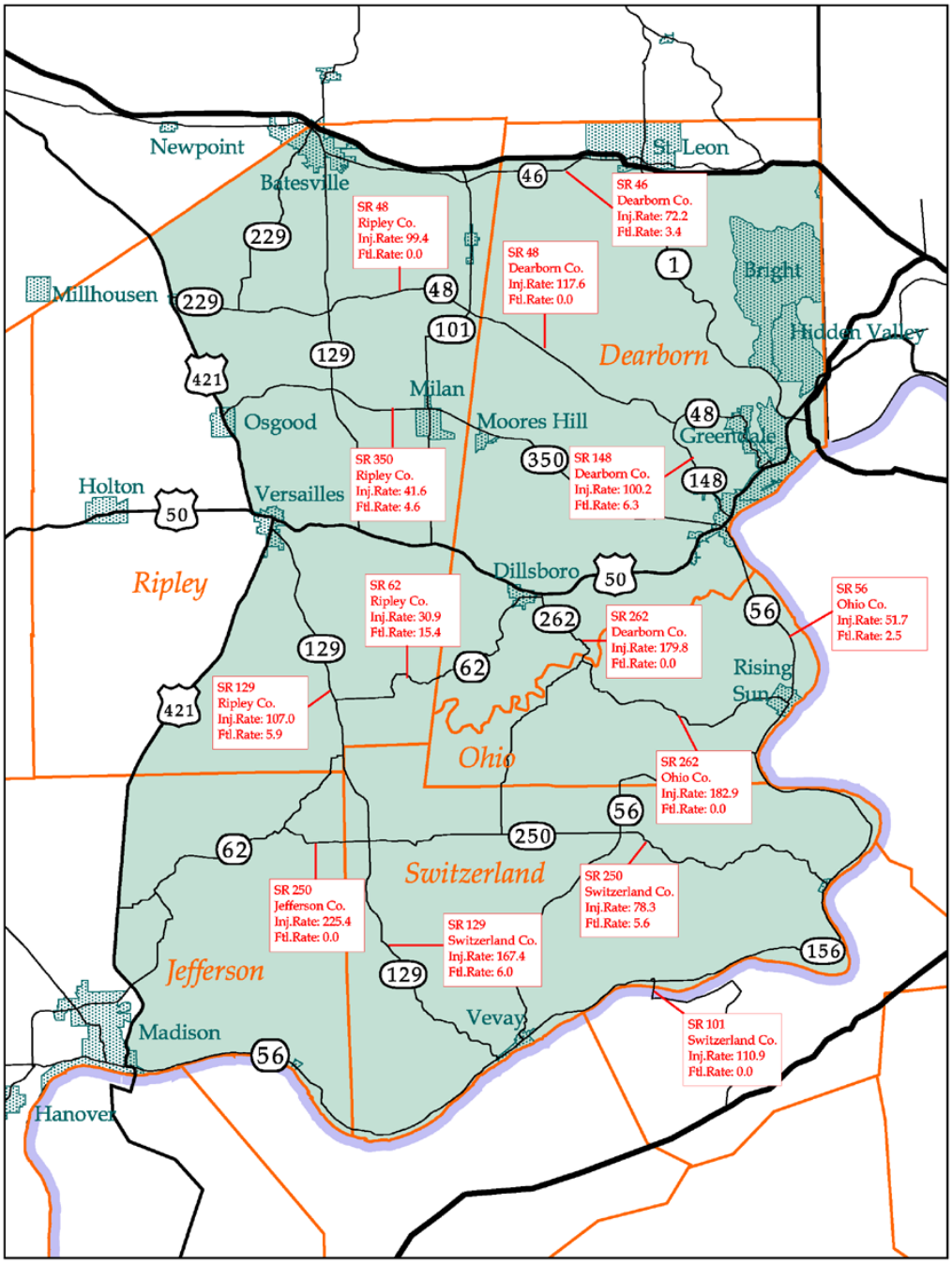


Table 3.1 Accident Rates for State Rural Arterial Roadways in SR 101 Study Area Locations with Injury and/or Fatality Rates Higher than State Average

Route	County	Daily VMT	Injuries (1996-1998)	Fatalities (1996-1998)	Injury Rate*	Fatality Rate*
U.S. 50	Ripley	111,607	80	6	**72.4**	**5.4**
U.S. 50	Dearborn	348,381	300	4	**87.0**	1.2
S.R. 1	Dearborn	100,536	63	4	**63.3**	**4.0**
S.R. 46	Ripley	14,367	21	1	**147.6**	**7.0**
S.R. 56	Jefferson	126,562	99	3	**79.0**	**2.4**
S.R. 56	Switzerland	21,511	40	2	**187.8**	**9.4**
S.R. 56	Dearborn	30,282	20	0	**66.7**	0.0
S.R. 62	Jefferson	167,458	100	3	**60.3**	1.8
S.R. 156	Switzerland	52,505	25	4	48.1	**7.7**
S.R. 156	Ohio	4,291	3	0	**70.6**	0.0
Other Principal and Minor Arterials	Indiana Statewide	31,627,273	15,780	659	50.4	2.1

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT data.

Notes: * Per 100 million annual vehicle miles of travel. Rates higher than statewide average shown in bold.

Table 3.2 Accident Rates for State Rural Collector Roadways in SR 101 Study Area Locations with Injury and/or Fatality Rates Higher than State Average

Route	County	Daily VMT	Injuries (1996-1998)	Fatalities (1996-1998)	Injury Rate*	Fatality Rate*
S.R. 46	Dearborn	29,395	21	1	72.2	**3.4**
S.R. 48	Dearborn	66,144	77	0	**117.6**	0.0
S.R. 148	Dearborn	16,131	16	1	**100.2**	**6.3**
S.R. 262	Dearborn	5,056	9	0	**179.8**	0.0
S.R. 250	Jefferson	9,860	22	0	**225.4**	0.0
S.R. 56	Ohio	80,066	41	2	51.7	**2.5**
S.R. 262	Ohio	9,942	18	0	**182.9**	0.0
S.R. 48	Ripley	18,297	18	0	**99.4**	0.0
S.R. 62	Ripley	6,541	2	1	30.9	**15.4**
S.R. 129	Ripley	16,997	18	1	**107.0**	**5.9**
S.R. 350	Ripley	43,656	18	2	41.6	**4.6**
S.R. 101	Switzerland	911	1	0	**110.9**	0.0
S.R. 129	Switzerland	16,899	28	1	**167.4**	**6.0**
S.R. 250	Switzerland	18,068	14	1	78.3	**5.6**
All Collectors	Indiana Statewide	41,501,010	37,242	538	90.6	1.3

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT data.

Notes: * Per 100 million annual vehicle miles of travel. Rates higher than statewide average shown in bold.

Table 3.3 Summary of Injury and Fatality Rates on State Arterial and Collector Roadways

County/State	Daily VMT	Injuries (1996-1998)	Fatalities (1996-1998)	Injury Rate*	Fatality Rate*
Dearborn	683,884	567	11	83.7	1.6
Jefferson	422,786	249	7	59.5	1.7
Ohio	94,299	62	2	66.4	2.1
Ripley	400,732	245	13	61.8	3.3
Switzerland	109,894	108	8	99.3	7.4
Indiana	73,128,283	53,022	1,197	73.2	1.7

Source: Bernardin-Lochmueller & Associates, Inc. from INDOT data.

Note: * Per 100 million annual vehicle miles of travel.

As traffic volumes within the study area continue to increase, accidents rates would also be expected to increase. Every accident represents a risk to human safety, as well as costs incurred by motorists and government agencies. In turn, efforts to reduce accidents represent potential benefits to motorists, communities, and government agencies in the study area and in Indiana. Of particular concern is the frequency of fatal accidents within the study area. This indicates a critical need to reduce the number and severity of accidents throughout the study area.

■ 3.2 Improve Regional Accessibility and Connectivity

Initial review of the existing and future traffic volumes and volume to capacity (v/c) ratios indicate that there are no serious traffic capacity issues within the study area apart from limited roadway sections in Lawrenceburg, Madison, and Versailles. However, due to a lack of north-south roadway connections in Switzerland and Ohio counties, the issues of accessibility and connectivity have been cited as major concerns in the study area.

A major factor influencing travel patterns within the study area is the location and number of Ohio River crossings. The 60-mile stretch of the Ohio River that forms the southeastern boundary of the study area is crossed by three bridges – at Madison, Markland, and Lawrenceburg. The

Route 101 Markland Dam Bridge is about 30 miles downstream from Lawrenceburg and about 30 miles upstream from Madison.

The bridge at Madison carries about 10,000 vehicles per day (vpd), and the bridge at Markland Dam carries about 2,000 vpd. I-275, which crosses the Ohio River near Lawrenceburg, serves as a bypass route around greater Cincinnati area, and the U.S. 50/I-275 connector carries about 25,000 vpd. In Indiana, regional access to the Markland Dam Bridge is constrained because access is provided by SR 156, a two-lane rural minor arterial running along the Ohio River. Furthermore, there is no continuous north-south arterial route from the Markland Dam to U.S. 50 and onto I-74. In Kentucky, the Route 101 Markland Dam Bridge connects to U.S. 42 and is about 10.1 miles via U.S. 42 and KY 35 from I-71 in northern Kentucky. The I-71 to U.S. 42 Connector under construction in Kentucky will shorten the distance between the Markland Dam Bridge and I-71 to 7.4 miles.

The importance of regional connectivity via an arterial route from the Markland Dam to I-74 is heightened by I-74 Bypass Conceptual Feasibility Study presently being conducted by the Kentucky Transportation Cabinet. As discussed in Section 2.5, this study is exploring a freeway or limited-access controlled arterial from the Markland Dam Bridge to the new Maysville Bridge linking I-74 to I-71 and I-75 in northern Kentucky.

Internal to External Access

While travelers in the northern portion of the study area have adequate connections to I-74, travelers in the southern portion oriented toward I-71 in Kentucky are restricted to the Ohio River bridges at Madison, Markland, and Lawrenceburg. The Markland Dam Bridge will soon be only seven miles from I-71, which provides highway connections north toward Cincinnati and south toward Louisville. Improved access to the Markland Dam Bridge via a north-south roadway would provide better access from the region toward Kentucky, southern Ripley County, and Switzerland County.

Internal Circulation

East-west travel within the study area is generally more convenient than north-south travel. East-west route options, such as SR 56, SR 250, U.S. 50, SR 48 and I-74 serve the major towns in the region such as Madison, Rising Sun, Versailles, Aurora, Lawrenceburg, and Batesville. Only U.S. 421 traverses the entire region in a north-south direction. While SR 129, SR 101, and SR 156/56 serve segments of north-south travel within the area, none provide a continuous north-south connection. Improved north-south connectivity within the study area would improve internal accessibility.

Through Movements

Through travel movements – trips originating outside the region and destined to other points outside the region – are limited by the number of Ohio River crossings and the lack of major roadway facilities through the area. Through trips desiring to travel between the Indianapolis area and northern Kentucky would choose either I-74 to the I-275 bridge crossing in Lawrenceburg or a combination of I-65 and SR 256 to reach Madison and cross the U.S. 421 bridge into Kentucky. While the Markland Dam Bridge also provides access into northern Kentucky, there is no convenient route connecting it to the larger southeastern Indiana area. There is a need to connect the Markland Dam bridge to a north-south roadway to provide better access through the region from Kentucky, southern Ripley County, and Switzerland County.

3.2.1 Personal Accessibility

The recent draft Purpose and Need Statement prepared for the I-69 Evansville-to-Indianapolis Study's Tier 1 Environmental Impact Statement[1] documents an analysis of personal accessibility for the entire state of Indiana. As defined in the I-69 Study's Purpose and Need Statement, "the concept of personal accessibility refers to the ease with which residents of a particular region can travel to population and employment centers and other types of attractions (e.g., health facilities, educational institutions, airports, and cultural events). Generally, a region that is well-connected internally and externally to common travel destinations will have a high degree of accessibility." Although the focus of the I-69 effort is on the southwestern portion of the state, the assessment covered the entire state and equally relevant information on accessibility was developed for southeastern Indiana and the SR 101 study area.

To perform this assessment, the I-69 study team utilized the Indiana Statewide Travel Demand Model. (The southeastern portion of this model was refined for analysis of travel behavior in the SR 101 study area.) This travel model includes substantial portions of the States of Kentucky, Illinois, Michigan, and Ohio and therefore accounts for the accessibility of areas along the state border to attractions such as employment and airports in neighboring states.

[1] Bernardin, Lochmueller & Associates, Inc., I-69 Evansville-to-Indianapolis Study Tier 1 Environmental Impact Statement, Draft Purpose and Need Statement, Prepared for the Indiana Department of Transportation, April 17, 2001.

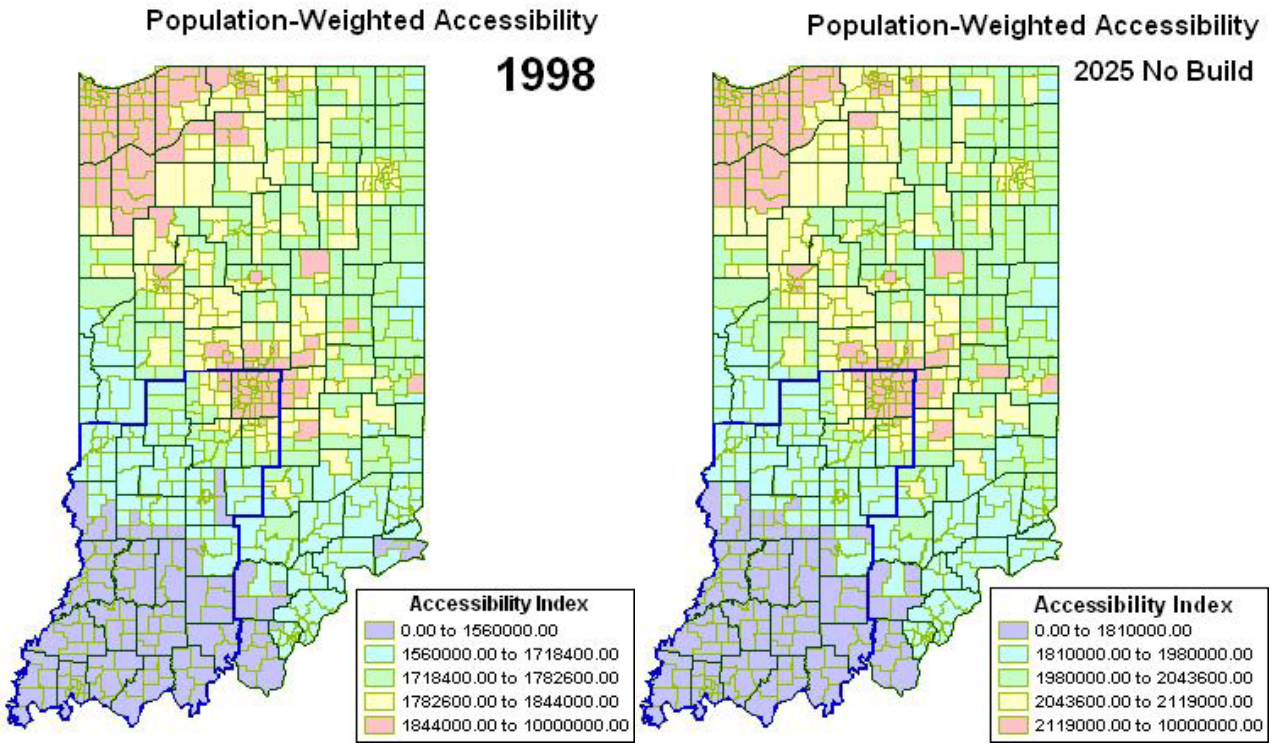
Detailed documentation of the analysis approach is provided in the draft I-69 Purpose and Need Statement. In summary, each traffic analysis zone (TAZ) in the model was assigned an "attractive force" (AF) rating where the higher the accessibility rating, the stronger the attraction of that TAZ as a destination for a particular type of travel – e.g., travel to urban areas, to airports, etc. The travel demand model calculates congested travel time between each TAZ and all other TAZ's in the state and then takes into account actual travel behavior in terms of an impedance factor that accounts for drivers' willingness to travel given alternative distances to destinations. This is then used to calculate an "accessibility index." The index for each TAZ is determined by calculating the ratio of attractive force to travel time between that TAZ and each other TAZ, and then calculating the sum of those ratios. The accessibility index for a TAZ will tend to be high (or more accessible) if the TAZ has short travel times to a large number of TAZ's with high attractive force ratings or low if the TAZ is surrounded by other TAZ's with low attractive force ratings or long travel times to TAZ's with higher attractive force ratings.

Using this methodology, the I-69 study team developed accessibility index measures for various single types of attractions. The relevant measures for the SR 101 study area included:

- Accessibility to Populations Centers (based on total population within each traffic analysis zone);
- Accessibility to Employment;
- Accessibility to Urban Areas (over 50,000 population);
- Accessibility to Major Airports; and
- Accessibility to Institutions of Higher Education.

The following pages present the figures and findings of the accessibility analysis as presented in the draft I-69 Purpose and Need Statement.

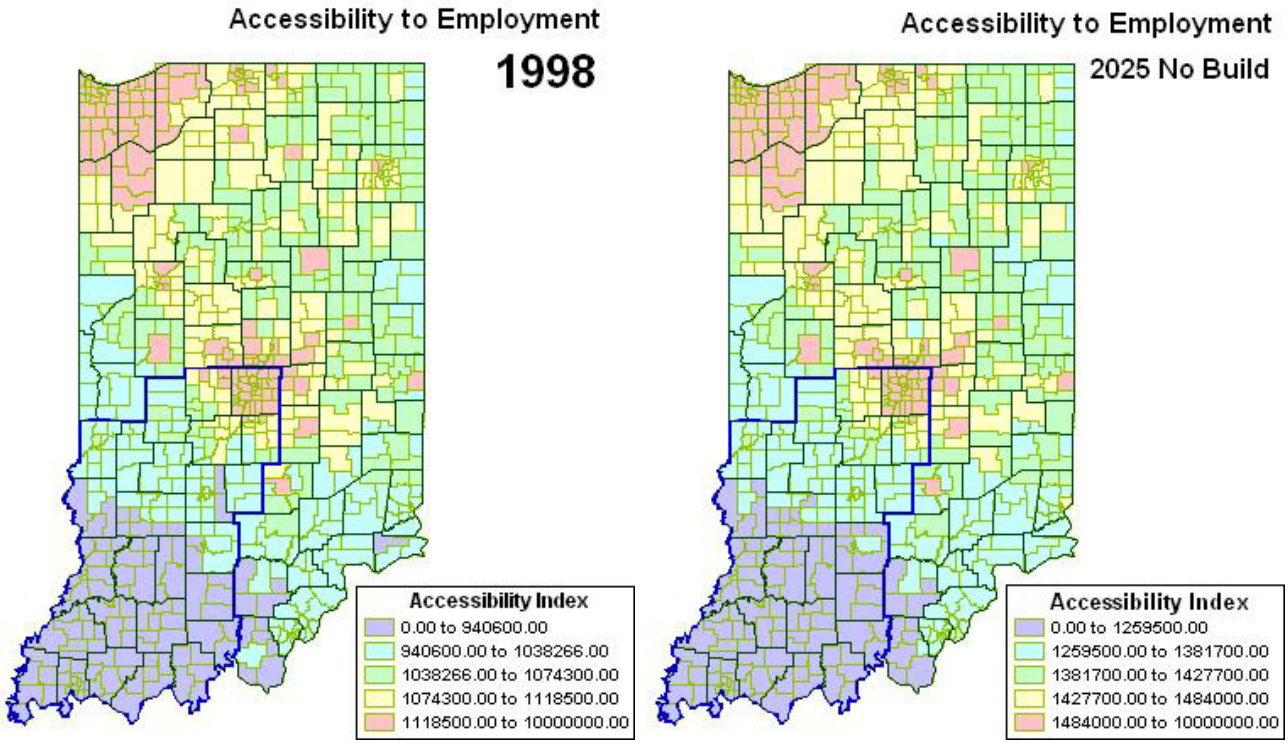
Figure 3.3 Indiana Accessibility to Population Centers



The color coding above shows the ranges of Accessibility to Population indices for Traffic Analysis Zones (TAZ) in the Indiana Statewide Travel Demand Model. Attraction to each TAZ was based on the total population in that TAZ. The higher the index, the greater accessibility a TAZ has to population in other TAZs. The color coding groups TAZs by 20 percent ranges, corresponding to the value of their accessibility indices. The bottom 20 percent of TAZs (the ones with the poorest population-weighted accessibility) are shown in blue, and the top 20 percent of TAZs (the ones with the best population-weighted accessibility) are shown in pink-violet.

These indices are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations. In calculating this index, AF is the population of each TAZ.

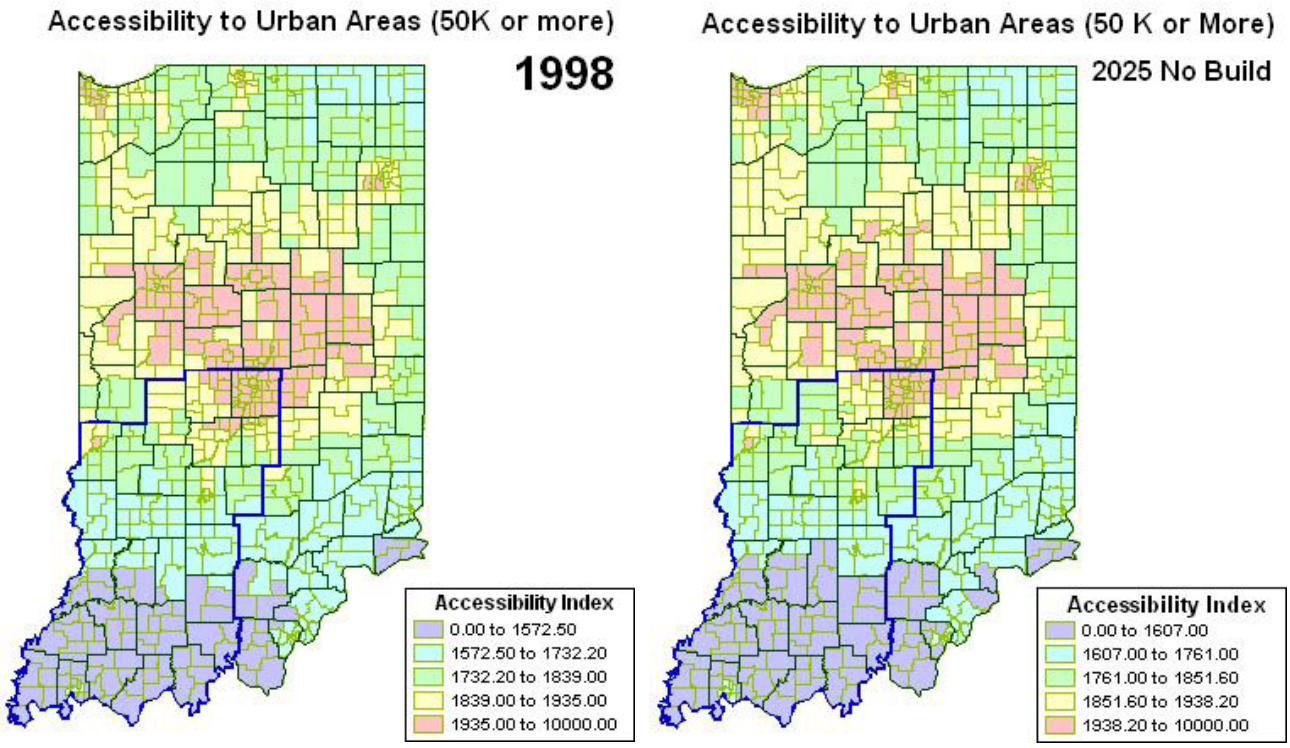
Figure 3.4 Indiana Accessibility to Employment



The color coding above shows the ranges of Accessibility to Employment indices for Traffic Analysis Zones (TAZ) in the Indiana Statewide Travel Demand Model. The higher the index, the greater accessibility a TAZ has to employment in other TAZs. The color coding groups TAZs by 20 percent ranges, corresponding to the value of their accessibility indices. The bottom 20 percent of TAZs (the ones with the poorest accessibility to employment) are shown in blue, and the top 20 percent of TAZs (the ones with the best accessibility to employment) are shown in pink-violet.

These indices are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations. In calculating this index, AF is the number of jobs located in each TAZ.

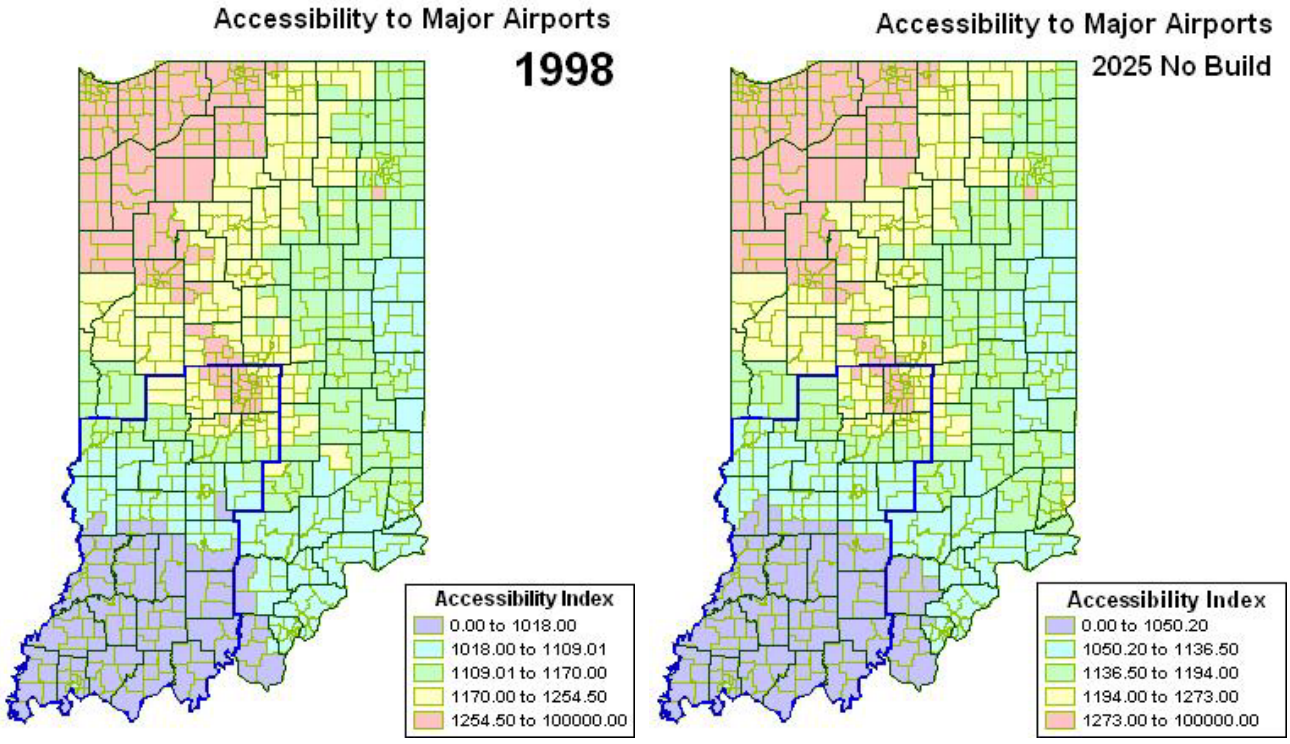
Figure 3.5 Indiana Accessibility to Urban Areas



The color coding above shows the ranges of Accessibility to Urban Area indices for Traffic Analysis Zones (TAZ) in the Indiana Statewide Travel Demand Model. The analysis was based on relative accessibility to the central business district (CBD) for urban areas of at least 50,000 population. The higher the index, the greater accessibility a TAZ has to urban areas of at least 50,000 population in other TAZs. The color coding groups TAZs by 20 percent ranges, corresponding to the value of their accessibility indices. The bottom 20 percent of TAZs (the ones with the poorest accessibility to urban areas) are shown in blue, and the top 20 percent of TAZs (the ones with the best accessibility to urban areas) are shown in pink-violet.

These indices are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations. In calculating this index, AF is equal to 1 for a single TAZ in the downtown of each major urban area, and 0 for any other TAZ. A major urban area is a city (including surrounding communities) with a population of at least 50,000.

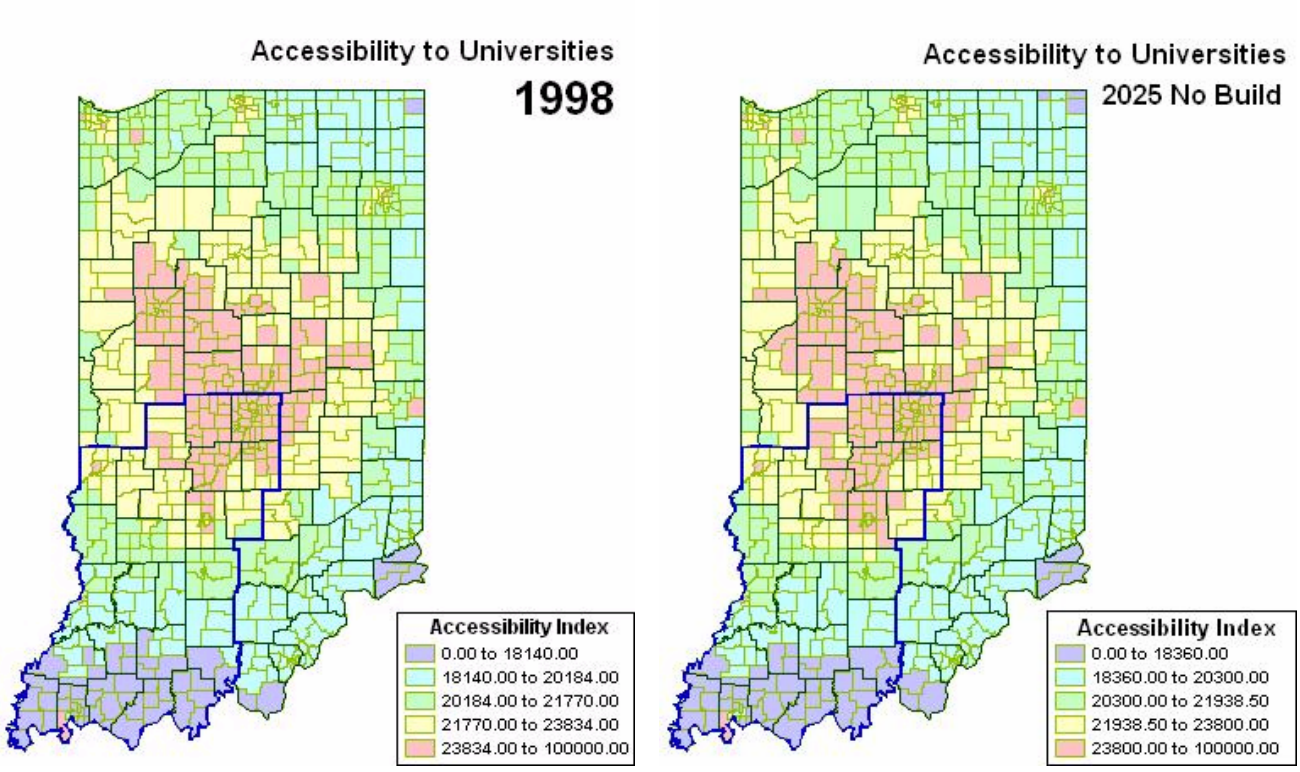
Figure 3.6 Indiana Accessibility to Major Airports



The color coding above shows the ranges of Accessibility to Major Airports indices for Traffic Analysis Zones (TAZ) in the Indiana Statewide Travel Demand Model. The higher the index, the greater accessibility a TAZ has to major airports in other TAZs. The color coding groups TAZs by 20 percent ranges, corresponding to the value of their accessibility indices. The bottom 20 percent of TAZs (the ones with the poorest accessibility to major airports) are shown in blue, and the top 20 percent of TAZs (the ones with the best accessibility to major airports) are shown in pink-violet.

These indices are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations. In calculating this index, AF is the annual air-passenger enplanements in each TAZ.

Figure 3.7 Indiana Accessibility to Institutions of Higher Education



The color coding above shows the ranges of Accessibility to Institutions of Higher Education for Traffic Analysis Zones (TAZ) in the Indiana Statewide Travel Demand Model. The higher the index, the greater accessibility a TAZ has to institutions of higher education in other TAZs. The color coding groups TAZs by 20 percent ranges, corresponding to the value of their accessibility indices. The bottom 20 percent of TAZs (the ones with the poorest accessibility to institutions of higher education) are shown in blue, and the top 20 percent of TAZs (the ones with the best accessibility to institutions of higher education) are shown in pink-violet.

These indices are calculated considering the access which each TAZ has to other zones both within and outside of Indiana. Outside of Indiana, zones in Illinois, Kentucky, Ohio, and Michigan are included in accessibility index calculations. In calculating this index, AF is the number of students enrolled in institutions of higher education which have enrollments of at least 2,500.

Findings of Personal Accessibility Analysis

The findings relevant to the SR 101 study area can be summarized as follows:

Accessibility to Populations Centers (Figure 3.3). The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998. Accessibility to these areas improves slightly in 2025.

Accessibility to Employment (Figure 3.4). The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998. Accessibility to these areas improves slightly in 2025.

Accessibility to Urban Areas (Figure 3.5). The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Parts of Switzerland County are among the least accessible areas of the state in 1998 and remain among the least accessible areas in 2025.

Accessibility to Major Airports (Figure 3.6). The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Accessibility to these areas improves slightly in 2025.

Accessibility to Institutions of Higher Education (Figure 3.7). The SR 101 Study area is less accessible than approximately 60 percent of the state of Indiana. Switzerland and Ohio Counties are among the least accessible areas of the state in 1998 and remain among the least accessible areas in 2025.

This analysis of regional accessibility substantiates local perceptions that regional accessibility is limited for at least some travel purposes, specifically travel to urban areas and institutions of higher learning. Limited accessibility to urban areas can affect local development opportunities due to higher travel times to these areas than from other locations in Indiana. Higher travel times can result in comparatively higher transportation costs to key economic activity centers such as urban areas.

3.2.2 Shortest Path Analysis

As a further assessment of accessibility in the SR 101 Study Area, the SR 101 Study Area travel demand model was used to evaluate the efficiency of existing transportation linkages within the study area. These linkages were assessed both in terms of travel time and travel distance based on the future (2025) transportation network. Comparisons were made of travel via an "ideal" or straight-line path versus travel on the available highway network. Given its importance as an Ohio River

crossing and its direct connectivity to I-71 in Kentucky (following completion of the I-71 connector), Markland Dam was considered a key trip terminus. From Markland Dam, travel time and distance was assessed to the nearest interchanges on U.S. 50 (Dillsboro) and I-74 (Saint Leon) as well as to Versailles. The trip between Vevay and Batesville, population centers at the northernmost and southernmost extremes of the study area, was also assessed.

Travel Distance

A straight line was drawn between locations within the SR 101 study area which would represent likely trips by private auto and commercial vehicles. This straight-line or ideal distance was then compared to the actual highway distance by the quickest existing route, considering the absolute difference in mileage and the ratio of straight-line mileage to actual mileage. The results of this comparison are shown in Table 3.4. As indicated, the discrepancy between actual and ideal travel distance is significantly higher for all trips to Markland Dam than between Vevay and Batesville at the northernmost and southernmost extremes of the study area.

Table 3.4 Comparison of Actual-to-Ideal Highway Distance
2025

	Distance		Mileage Difference	Mileage Linkage Index
	Shortest Path	Straight-line	Actual Versus Ideal	Actual Versus Ideal
Markland Dam – U.S. 50 at Dillsboro	39.48	17.01	22.47	0.43
Markland Dam – I-74 at Saint Leon	53.94	34.17	19.77	0.63
Markland Dam - Versailles	35.68	25.08	10.60	0.70
Vevay – Batesville	49.88	39.70	10.18	0.80

Travel Time

Similar to the analysis of travel distance, to assess travel time efficiency, a straight line was drawn between the same locations within the SR 101 study area. In this case, travel speed was assumed to be equal to the average network travel speed as calculated by the SR 101 travel demand model for a rural major arterial roadway within the study area for each analysis year. This straight-line or ideal travel time was then compared to the

actual highway travel time by the quickest existing route based on the absolute difference in travel time and the ratio of straight-line travel time to actual travel time. The results of this comparison are shown in Table 3.5. As indicated, consistent with the findings of the travel distance analysis, the discrepancy between actual and ideal travel distance is significantly higher for all trips to Markland Dam than between Vevay and Batesville at the northernmost and southernmost extremes of the study area.

Table 3.5 Comparison of Actual-to-Ideal Travel Time

2025

	Travel Time (Minutes)		Travel Time Difference	Travel Time Linkage Index
	Shortest Path	Straight-line	Actual Versus Ideal	Actual Versus Ideal
Markland Dam – U.S. 50 at Dillsboro	42.35	18.89	25.34	0.40
Markland Dam – I-74 at Saint Leon	60.25	37.97	26.08	0.57
Markland Dam - Versailles	36.66	27.85	11.58	0.68
Vevay – Batesville	51.23	44.08	11.53	0.77

4.0 Preliminary Alternatives

4.1 Description of Preliminary Alternatives

All Build alternatives were initially developed with two options – a southern segment providing connection from the southern portion of the study area to U.S. 50 and an optional northern segment which includes the southern segment but also provides a connection from U.S. 50 to I-74 at the northern edge of the study area. It should be noted that at the time of this study's initiation, the study objective was to examine the feasibility of potential connections to U.S. 50 as the northern terminus of SR 101 corridor improvements. As the study has progressed, resulting in further understanding of needs of the study area, study objectives expanded to encompass the feasibility of a corridor with a northern terminus at I-74. Therefore, each Build alternative was defined with two options – a northern terminus at U.S. 50 and a northern terminus at I-74. In order to distinguish between these options, each alternative option terminating at U.S. 50 was designated as an "A" alternative; "B" alternatives *include their complementary "A" alternative* continuing to a northern connection to I-74.

The following alternatives were initially considered:

- **Alternative 1A and 1B:** A roadway between Markland Dam (east of Vevay on SR 156) and SR 129 at U.S. 50 (east of Versailles) with possible upgrade of SR 129 to I-74;

- **Alternative 2A and 2B:** A roadway between Markland Dam (east of Vevay on SR 156) and SR 101 at U.S. 50 (east of Versailles) with possible upgrade of SR 101 to I-74;

- **Alternative 3A and 3B:** A roadway between Markland Dam (east of Vevay on SR 156) to U.S. 50 east of Dillsboro with possible extension to I-74;

- **Alternative 4:** Transportation systems management (TSM) enhancements on SR 129 between SR 250 and SR 56; on SR 56 between Vevay and SR 250; and, on SR 156 between Vevay and Rising Son; and

- **Alternative 5:** Do nothing or No Build. This is also referred to as the "E+C" alternative because it assumes all currently programmed projects (expected and constructed) will be in place in the study area by 2025.

Following the publication and circulation of the SR 101 Draft Preliminary Alternatives Report in October 2001, meetings were held with interested parties to obtain further input into the identification of preliminary alternatives for the SR 101 Study Area. This included meetings in November 2001 with the SR 101 Advisory Committee and the federal and state resource agencies, and a widely-publicized public information meeting in Versailles. Based on input from these meetings, additional alternatives were identified for consideration.

At the meeting of resource agencies mentioned above, multiple alternatives were submitted by U.S. Environmental Protection Agency, Region 5 for consideration. To maintain a consistent means of identification, the numbering scheme used to identify the additional alternatives maintains compatibility with the numbering of alternatives submitted by U.S. EPA staff. Based on an initial staff level screening, some of these alternatives were found to be similar to other alternatives or involve corridor alignments which are significantly longer in distance than closely comparable alternatives. Therefore, some of these proposed alternatives were eliminated from further consideration, resulting in gaps in the numbering sequence.[1]

The additional alternatives retained for further screening were as follow:

- **Alternative 9A and 9B:** Upgrade of SR 156 west of Vevay and SR 129 north to U.S. 421 into Versailles with possible upgrade of U.S. 421 north of Versailles to a new roadway connecting U.S. 421 with SR 229 to Batesville and I-74;

- **Alternative 11A and 11B:** A roadway between Markland Dam to SR 56/SR 250 junction with upgrade of SR 56 to Aurora; possible extension involving upgrade of SR 148 and new roadway to SR 1, connecting to I-74 in Saint Leon; and

- **Alternative 16A and 16B:** Upgrade of SR 129 from Vevay to new roadway connecting SR 129 south of Versailles to SR 129 at U.S. 50 east of Versailles; possible upgrade of SR 129 north of U.S. 50 to I-74.

The following discussion describes these alternatives in more detail. It should be emphasized that these are *approximate* corridors. In areas where a proposed alternative follows an existing road or goes through a populated area, it is assumed that route modifications will be made where possible to reduce impacts. More detailed analysis of a preferred corridor will

[1] A summary of the additional alternatives and the rationale for their elimination from further screening is included as Appendix A to the Screening of Preliminary Alternatives Technical Memorandum (March 2002).

take place during the environmental impact assessment phase of project development.

Alternative 1A – Roadway to SR 129/U.S. 50 *(Figure 4.1)*

This alternative would involve the construction of a roadway between Markland Dam at SR 156, east of Vevay, and SR 129 at U.S. 50, approximately 3.5 miles east of Versailles. The roadway would run concurrent with a portion of Bear Branch Road, north of SR 250, for approximately two miles.

Alternative 1B – Roadway to SR 129/U.S. 50 and SR 129 to I-74 *(Figure 4.1)*

This alternative would include Alternative 1A with upgrading of SR 129 north of U.S. 50 to I-74. From U.S. 50, SR 129 connects to SR 46 in Batesville, in proximity to the Batesville interchange with SR 229 on I-74 (Exit 149). Alternative 1B could include improved access to I-74 from SR 129 by either enhancing the existing access via SR 229, or by extending SR 129 to I-74, potentially requiring construction of a new or modified interchange.

Alternative 2A – Roadway to SR 101/U.S. 50 *(Figure 4.2)*

This alternative would involve the construction of a roadway between Markland Dam at SR 156, east of Vevay, and SR 101 at U.S. 50, approximately 10 miles east of Versailles. The roadway would run concurrent with a portion of Bear Branch Road, north of SR 250 at Fairview, approximately two miles.

Alternative 2B – Roadway to SR 101/U.S. 50 and SR 101 to I-74 *(Figure 4.2)*

This alternative would include Alternative 2B with upgrading of SR 101 north of U.S. 50 to I-74. From U.S. 50, SR 101 runs through Milan and Sunman, connecting to SR 46 east of Batesville and an interchange on I-74 (Exit 156) between Batesville and St. Leon. This alternative could be designed to eliminate the "jog" in SR 101 north of Milan.

Alternative 3A – Roadway to U.S. 50 (via SR 56) *(Figure 4.3)*

This alternative would involve the construction of a roadway between Markland Dam at SR 156, east of Vevay, and U.S. 50, between Dillsboro and Aurora. The roadway would run concurrent with a two-mile portion of SR 56, north of SR 250.

Alternative 3B – Roadway to U.S. 50 (via SR 56) with Continuation to I-74 *(Figure 4.3)*

This alternative would include Alternative 3A with a continuation of the roadway north of U.S. 50 to provide a continuous connection to I-74 in the vicinity of St. Leon.

Alternative 4 – TSM Enhancements *(Figure 4.4)*

This alternative will involve a range of transportation systems management (TSM) enhancements to existing roadways with the objective of eliminating potential hazards and improving roadway safety. These enhancements could include a variety of improvements such as pavement and shoulder widenings and reductions in steep grades and tight curves. Based on a review of accident statistics and traffic volumes, roadways initially identified for TSM improvements include: a) SR 129 between SR 250 and SR 56 in Vevay (SR 129 is presently programmed for reconstruction from SR 250 to SR 56, resulting in improved vertical/horizontal curves, lane widths and shoulder widths); b) SR 56 in Switzerland County; and, c) SR 156 between Vevay and Rising Sun.

Alternative 5 – No Build

This alternative would involve no changes to the existing highway network in the study area other than projects that are already programmed or committed. This alternative will provide a baseline for comparison to the other alternatives.

Alternative 9A – SR 156 to SR 129/U.S. 421 (Versailles) *(Figure 4.5)*

This alternative would involve the upgrading of two existing roadways, SR 156/SR 56, and SR 129. The alternative would include improvements to a portion of SR 156, from Markland Dam west to Vevay, where it becomes SR 56, and to the intersection with SR 129. The roadway would

then run north concurrent with SR 129, connecting to U.S. 421 and U.S. 50 at Versailles. This alternative would encompass recent and future improvements programmed for SR 129 south of U.S. 50. Reconstruction of SR 129 between SR 250 and U.S. 50 has been completed and is programmed from SR 56 to SR 250 for 2003.

Alternative 9B – SR 156 to SR 129/U.S. 421/SR 229 (Batesville)/I-74 *(Figure 4.5)*

In addition to the roadway upgrades proposed in Alternative 9A, Alternative 9B includes upgrading of existing roadways and roadway construction between Versailles at U.S. 50/U.S. 421 and Batesville. The proposed corridor would run concurrent with a portion of U.S. 421, from Versailles to SR 350 at Osgood. A new roadway segment would be constructed between Osgood at the intersection of U.S. 421 and SR 350, and the SR 229/SR 48 junction. The roadway will then run concurrent with SR 229, providing a direct connection to I-74 via the existing interchange at Batesville (Exit 149). As with Alternative 9A, this alternative would encompass recent and future improvements programmed for SR 129 south of U.S. 50.

Alternative 11A – Roadway to SR 250/SR 56 (to Aurora) *(Figure 4.6)*

This alternative would involve the construction of a roadway between Markland Dam at SR 156 and East Enterprise at the SR 56/SR 250 junction. The roadway will continue north, roughly concurrent with existing SR 56 to U.S. 50 at Aurora, via a short segment of SR 350.

Alternative 11B – Roadway to SR 250/SR 56/SR 148/SR 1 (St. Leon)/I-74 *(Figure 4.6)*

In addition to the roadway construction proposed in Alternative 11A, Alternative 11B includes the upgrade of SR 148 to Kirschs Corner, where SR 148 intersects with SR 48. A new roadway would be constructed from Kirschs Corner to SR 1 in the vicinity of Guilford, and then the roadway will run concurrent with SR 1 to I-74 (Exit 164) at St. Leon. INDOT has programmed the reconstruction of SR 1 from I-74 to U.S. 50 and SR 56 from Aurora to Rising Sun. This alternative would potentially encompass these improvements.

Alternative 16A – SR 129 Connector *(Figure 4.7)*

This alternative would involve the construction of a connector between SR 129 in the vicinity of Olean and the intersection of SR 129 and U.S. 50 east of Versailles, providing greater continuity for SR 129. Similar to Alternative 9A, this alternative also would include improvements to a portion of SR 156, from Markland Dam west to Vevay where it becomes SR 56, to the intersection with SR 129. Also included would be an upgrade of SR 129 between Vevay and Olean. This alternative would encompass recent and future improvements programmed for SR 129 south of U.S. 50. Reconstruction of SR 129 between SR 250 and U.S. 50 has been completed and is programmed from SR 56 to SR 250 for 2003.

Alternative 16B – SR 129 Connector/I-74 *(Figure 4.7)*

In addition to the roadway construction proposed in Alternative 16A, Alternative 16B includes the upgrade of SR 129 north of U.S. 50 to SR 46 at Batesville. At present, traffic from SR 129 to I-74 must take SR 46 into Batesville, and then SR 229 north in order to access I-74. Alternative 16B could include improved access to I-74 from SR 129 by either enhancing the existing access via SR 229, or by extending SR 129 to I-74, potentially requiring the construction of a new or modified interchange. As with Alternative 16A, this alternative would encompass recent and future improvements programmed for SR 129 south of U.S. 50.

Figure 4.1 Alternative 1A and 1B – Roadway to SR 129/U.S. 50

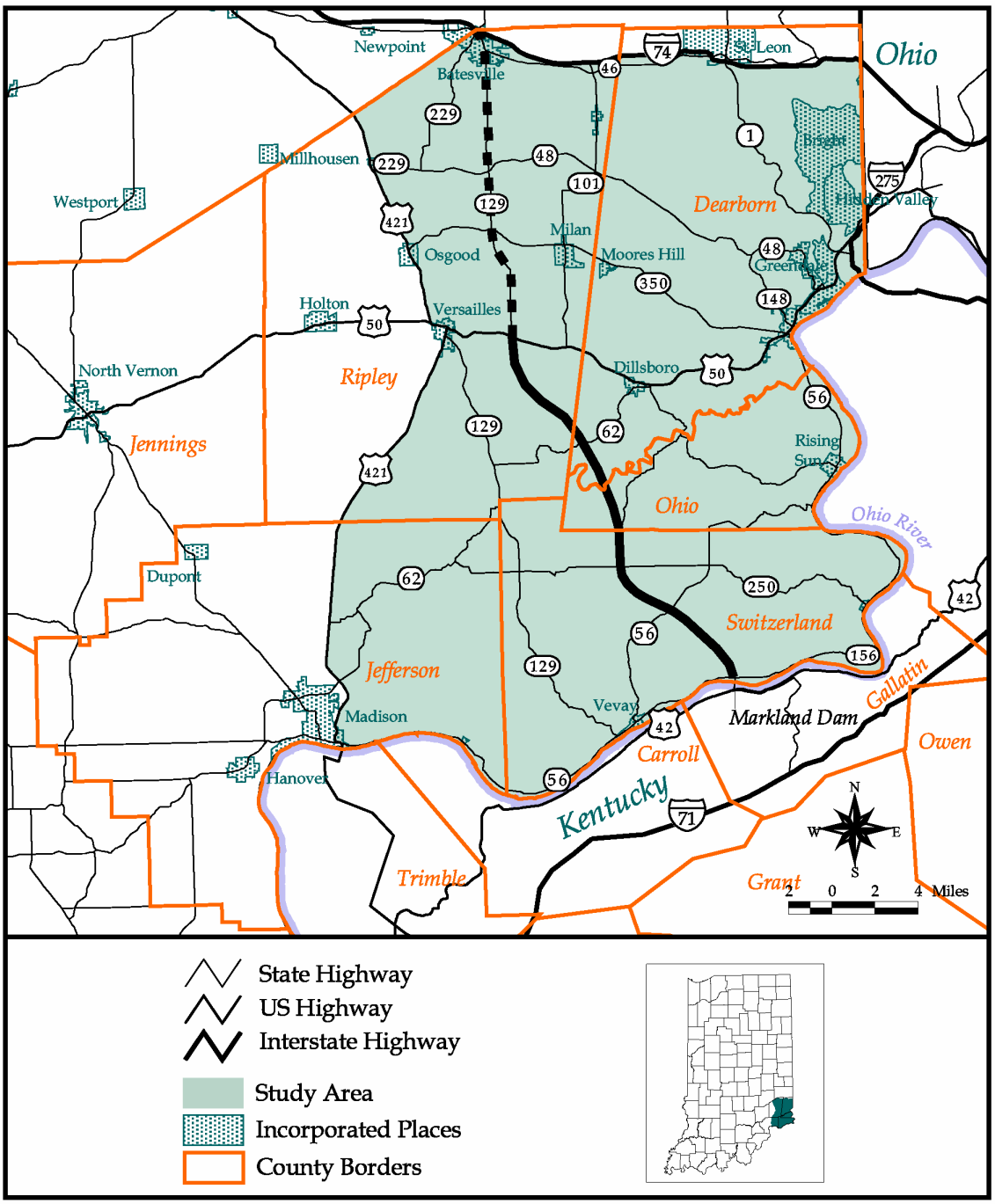


Figure 4.2 Alternative 2A and 2B – Roadway to SR 101/U.S. 50

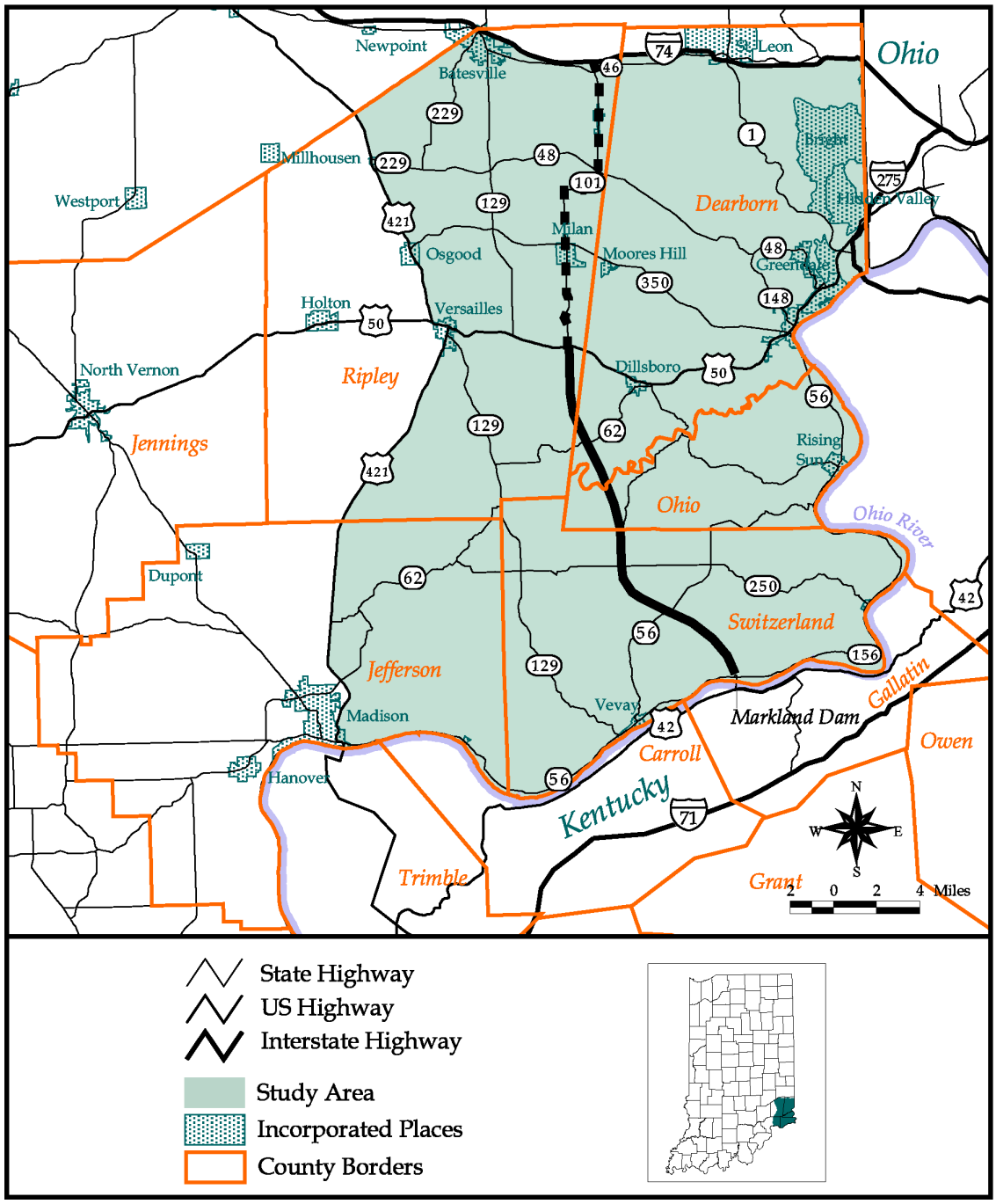


Figure 4.3 Alternative 3A and 3B – Roadway to U.S. 50 (via SR 56)

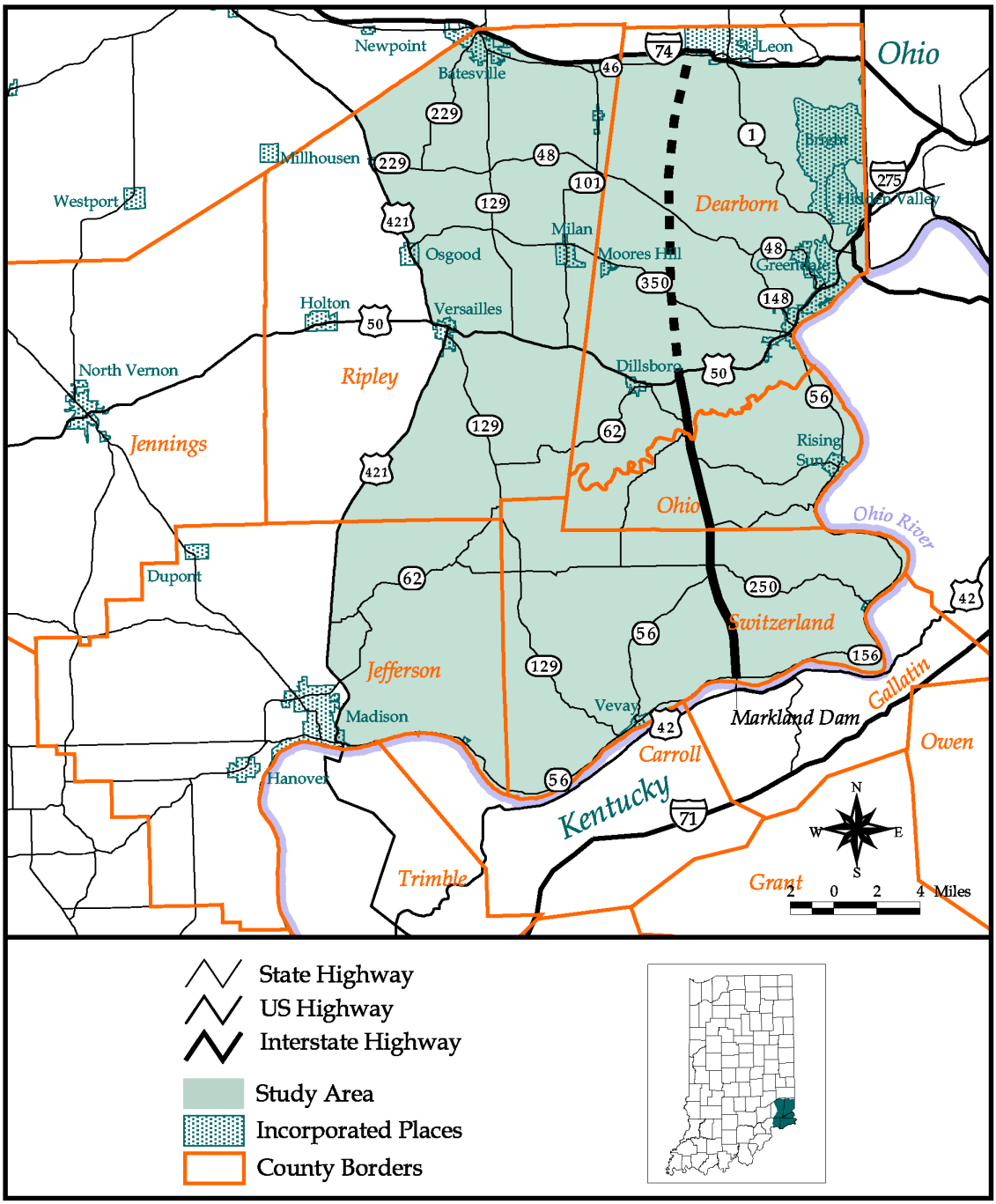


Figure 4.4 Alternative 4 – Transportation Systems Management (TSM) Enhancements

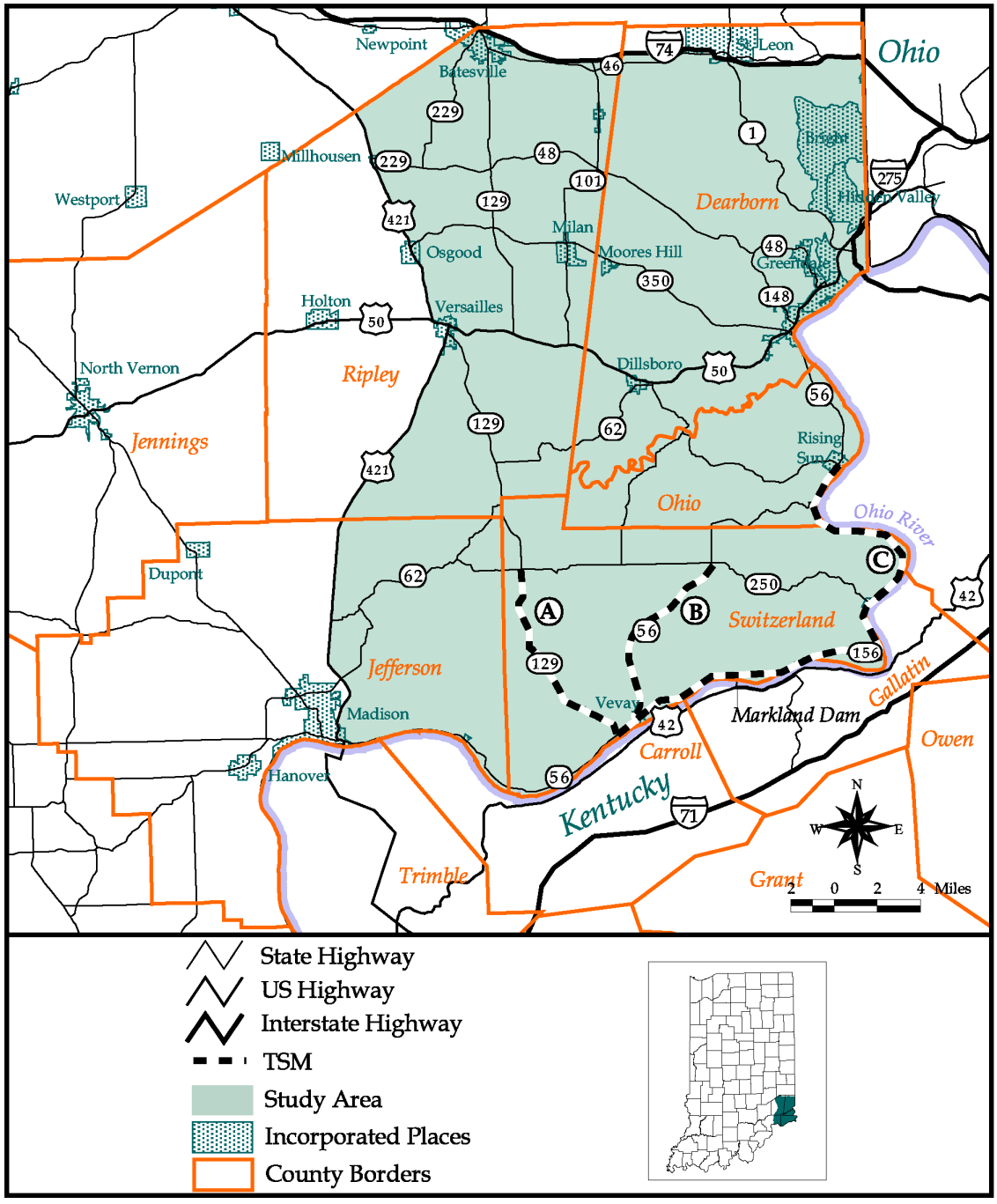


Figure 4.5 Alternative 9A and 9B – SR 156 to SR 129/U.S. 421

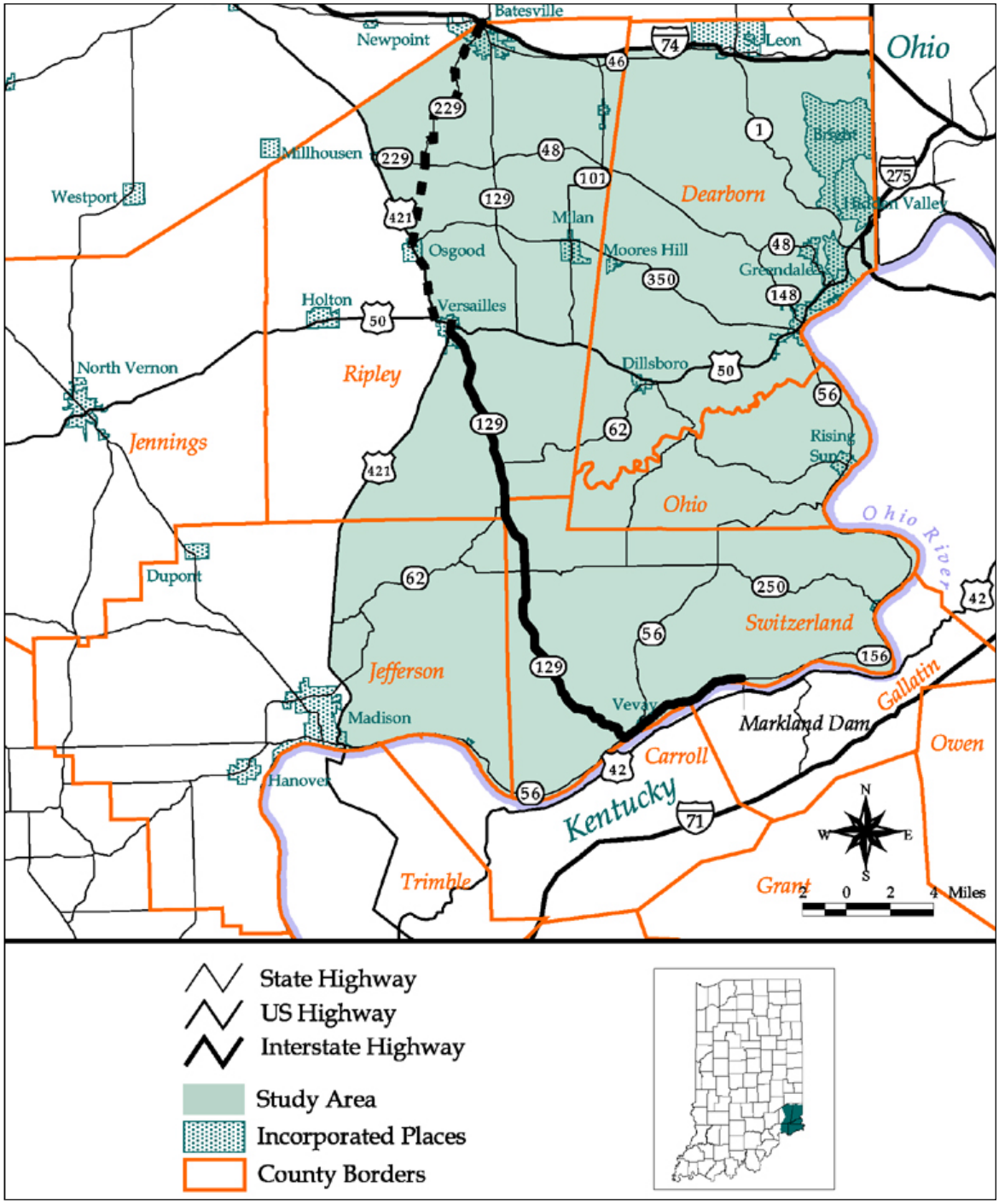


Figure 4.6 Alternative 11A and 11B – Roadway to SR 250/SR 56/(SR 148/SR 1)

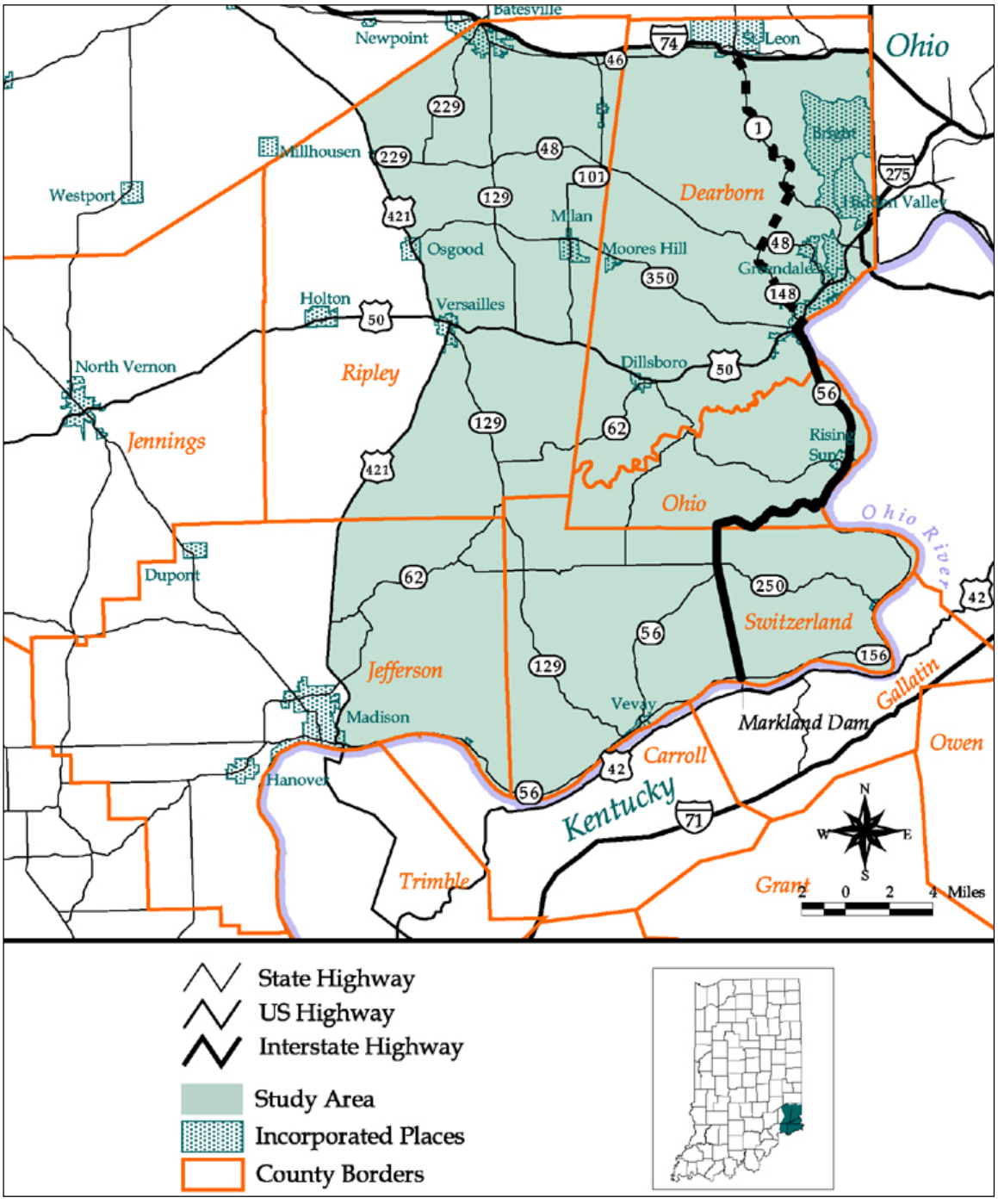
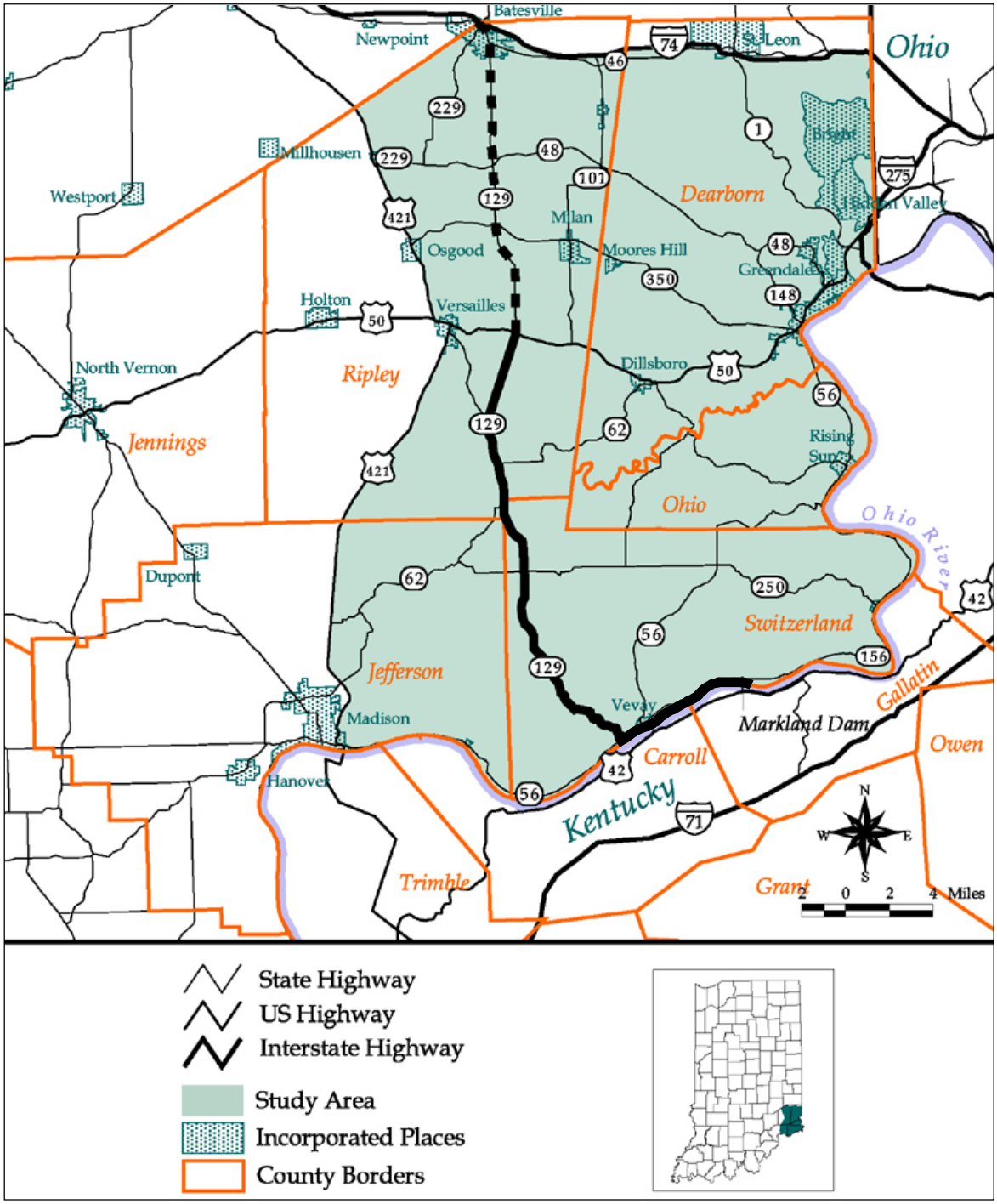


Figure 4.7 Alternative 16A and 16B – SR 129 Connector



4.2 Evaluation of Preliminary Alternatives

The following section summarizes key attributes of the preliminary alternatives based on the screening of preliminary alternatives documented in the Screening of Preliminary Alternatives Technical Memorandum, published March 2002. This initial screening was intended to identify a limited number of alternatives for detailed analysis based on the following criteria:

- Potential safety benefits;
- Access and travel distance;
- Length of construction and use of existing right-of-way (ROW); and
- Environmental and community impacts including potential impacts to 4(f) properties.[2]

4.2.1 No Build Alternative

The No Build alternative provides no benefits in terms of improved access and/or travel distance and no benefits in terms of potential to improve roadway safety. However, it provides a baseline for the evaluation of benefits resulting from the Build alternatives.

4.2.2 TSM Alternative

Because this alternative would involve only reconstruction of existing roadways for the purpose of eliminating safety hazards, it would provide no benefits in terms of improved access and/or travel distance, a primary goal identified for the study area. Preliminary assessment of improvements which would need to be addressed through this alternative also indicates that this could be a higher cost alternative than other Build alternatives due to the likely need to reconstruct substantial portions of SR 56 and SR 156 rather than "spot" improvements in limited areas.

[2] Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) declares that "It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges and historic sites." Section 4(f) applies to publicly owned lands which are managed as parks and recreation areas, wildlife or waterfowl refuges, and to all historic sites regardless of ownership.

4.2.3 Build Alternatives to U.S. 50 ("A" Alternatives)

- **Alternative 1A –** This alternative is in the high range for reduced travel distance between key locations and provides a direct connection to Markland Dam. It is in the medium range for safety benefits because its overall potential to reduce VMT may be limited due to the availability of a competing corridor (SR 129) to the west.

- **Alternative 2A –** This alternative is in the high range for reduced travel distance between key locations and provides a direct connection to Markland Dam. It is in the medium range for safety benefits because its overall potential to reduce VMT may be limited due to the availability of a competing corridor (SR 129) to the west. This alternative provides the best connection from Markland Dam/Vevay to I-74 (of the alternatives terminating at U.S. 50) and the second best in connection to U.S. 50.

- **Alternative 3A –** This alternative is in the high range for reduced travel distance between key locations; also provides a direct connection to Markland Dam. It provides the best connection from Markland Dam/Vevay to U.S. 50; second best in connection from Markland Dam to I-74 (but fourth from Vevay to I-74). Also, it is in the high range for safety benefits due to potential to reduce VMT and to divert traffic to an improved roadway.

- **Alternative 9A –** Although this alternative requires the least amount of new construction of all alternatives terminating at U.S. 50 and therefore involves the greatest utilization of existing infrastructure, it provides no benefit in reduced travel distance between key locations and only an indirect connection to Markland Dam. It follows existing right-of-way, thereby providing little benefit relative to reduced VMT or traffic diversion. It would encompass benefits from recent and committed improvements to SR 129 south of U.S. 50. Also, some safety improvements would result from improvements to SR 156.

- **Alternative 11A –** This alternative would provide a direct connection to Markland Dam via a new roadway from SR 56, but the majority of construction would be on existing right-of-way. This alternative can provide some reduction in VMT and potential to divert traffic to an improved roadway but the majority of the alignment follows existing SR 56, limiting the overall reduction in travel distance between key locations. The reconstruction of SR 56 from Aurora to Rising Sun is already a committed improvement. As a result, there is small or no benefit in terms of travel distance over No Build.

- **Alternative 16A –** This alternative provides a small benefit in reduced travel distance between key locations and only an indirect connection

to Markland Dam. It primarily follows existing right-of-way except for the new segment south of U.S. 50 which provides greater continuity for SR 129. Therefore, this alternative appears to provide little benefit relative to reduced VMT or traffic diversion. However, of the alternatives terminating at U.S. 50 which also provide improved accessibility between key locations in the study area, this alternative involves the least amount of new construction on either new ROW or existing ROW and the greatest utilization of "adequate" roadway. It also provides a bypass for north-south traffic around the town of Versailles which may benefit from improved traffic operations. This alternative would encompass benefits from recent and committed improvements to SR 129 south of U.S. 50. Also, some safety improvements would result from improvements to SR 156.

4.2.4 Build Alternatives to I-74 ("B" Alternatives)

- **Alternative 1B –** This alternative is in the high range for reduced travel distance between key locations and provides a direct connection to Markland Dam. It is in the medium range for safety benefits because its overall potential to reduce VMT may be limited due to the availability of a competing corridor (U.S. 421 and SR 129) to the west.

- **Alternative 2B –** This alternative is in the high range for reduced travel distance between key locations and provides a direct connection to Markland Dam. It is in the medium range for safety benefits because its overall potential to reduce VMT may be limited due to the availability of a competing corridor (U.S. 421 and SR 129) to the west. It provides the best connection from Markland Dam/Vevay to I-74 (of the alternatives terminating at U.S. 50) and the second best in connection to U.S. 50.

- **Alternative 3B –** This alternative is in the high range for reduced travel distance between key locations; it also provides a direct connection to Markland Dam. It provides the best connection from Markland Dam/Vevay to U.S. 50 and Vevay to I-74; second best in connection from Markland Dam to I-74. It is also in high range for safety benefits due to potential to reduce VMT and to divert traffic to an improved roadway.

- **Alternative 9B –** This alternative provides no benefit in reduced travel distance between key locations and only an indirect connection to Markland Dam. It follows existing right-of-way, thereby providing little benefit relative to reduced VMT or traffic diversion. North-south traffic utilizing this alternative would need to travel through the town center of Versailles. This alternative would encompass benefits from

recent and committed improvements to SR 129 south of U.S. 50. Also, some safety improvements would result from improvements to SR 156.

- **Alternative 11B –** This alternative would provide a direct connection to Markland Dam via a new roadway from SR 56, but the majority of construction would be on existing right-of-way. This alternative can provide some reduction in VMT and potential to divert traffic to an improved roadway but the majority of the alignment follows existing SR 56 and SR 1, limiting the overall reduction in travel distance between key locations. The reconstruction of SR 56 from Aurora to Rising Sun and SR 1 from I-74 to Lawrenceburg are already committed projects. As a result, there is small or no benefit in terms of travel distance over No Build.

- **Alternative 16B –** This alternative provides a small benefit in reduced travel distance between key locations and only an indirect connection to Markland Dam. It primarily follows existing right-of-way except for the new segment south of U.S. 50, providing greater continuity for SR 129. Therefore, this alternative appears to provide little benefit relative to reduced VMT or traffic diversion. However, this alternative involves the least amount of new construction on either new ROW or existing ROW and the greatest utilization of "adequate" roadway of all alternatives terminating at I-74 at the northern edge of the study area. It also provides a bypass for north-south traffic around the town of Versailles which may benefit from improved traffic operations. This alternative would encompass benefits from recent and committed improvements to SR 129 south of U.S. 50. Also, some safety improvements would result from improvements to SR 156.

■ 4.3 Some Summary Conclusions

Table 4.1 provides a summary of the ranking of each alternative according to preliminary screening criteria of safety, accessibility, new roadway construction, and parkland impacts.

Some further observations:

- The TSM alternative may address the identified goal of improved travel safety but it does not address the goal of improved regional accessibility and connectivity. TSM enhancements could potentially be incorporated as spot improvements into other Build alternatives which address the goal of improved regional accessibility and connectivity to enhance overall roadway safety.

- Alternatives 9A/9B and 11A/11B provide little or no improvement in accessibility between key locations in the study area.

- It is not intuitively apparent that Alternative 9B, and 16 A/B would draw significant traffic from I-74. Traffic oriented to/from Indianapolis would have more direct southerly access via U.S. 421. Traffic oriented to/from Ohio and Cincinnati would be able to utilize either U.S. 50 to Dillsboro or SR 56 from Lawrenceburg. However, both Alternatives 9B and 16 A/B provide improved continuity to the study area's existing road network.

- Alternatives 1B and 2B follow parallel corridors, however Alternative 2B provides a more direct, shorter connection to I-74.

Table 4.1 Summary Evaluation

Alternative	Description	Safety Ranking	Accessibility Ranking	Length of New Construction (miles)	Impact to 4(f) Properties
No Build/TSM					
4	TSM Enhancements	M	L	33.8	No
5	No Build	None	L	0.0	No
Build (to U.S. 50)					
1A	Roadway to SR 129/U.S. 50	M	H	23.2	Possible
2A	Roadway to SR 101/U.S. 50	M	H	21.5	No
3A	Roadway to U.S. 50 (via SR 56)	H	H	16.9	No
9A	SR 156 to SR 129/U.S. 421 (Versailles)	M	L	7.2	Possible
11A	Roadway to SR 250/SR 56 (to Aurora)	M	M	19.1	No
16A	SR 129 Connector	M	M	12.7	Possible
Build (to I-74)[2]					
1B	Roadway to SR 129/U.S. 50/I-74	M	H	23.2	Possible
2B	Roadway to SR 101/U.S. 50/I-74	H	H	38.8	No
3B	Roadway to U.S. 50 (via SR 56)/I-74	H	H	35.3	No
9B	SR 156 to SR 129/U.S. 421/SR 229 (Batesville)/I-74	M	L	22.1	Possible
11B	Roadway to SR 250/SR 56/SR 148/SR 1 (St. Leon)/ I-74	M	M	29.3	No
16B	SR 129 Connector/I-74	M	M	12.7	Possible

Note: L = Low; M = Medium; H = High.

4.4 Recommendations for Detailed Analysis

Based on the screening of preliminary alternatives and the evaluation discussed above, it was recommended with concurrence from INDOT that the SR 101 Corridor Improvement Feasibility Study adopt the following alternatives for detailed analysis:

- **No Build –** This alternative is required for conventional alternatives analysis. It provides a baseline for comparison of impacts resulting from Build alternatives.

- **Alternative 2B –** This alternative ranks high in terms of improved accessibility between key locations in the study area as well as potential safety benefits. It would result in substantial improvement to existing roadway (SR 101 north of U.S. 50) while taking advantage of an existing interchange on I-74 with direct access to the existing SR 101 corridor.

- **Alternative 3B –** This alternative ranks highest in terms of improved accessibility between key locations in the study area and also ranks high for potential safety benefits. It would require development of a new right-of-way north of U.S. 50, rather than adaptation of an existing right-of-way. It also would provide for a new interchange on I-74.

- **Alternatives 16B –** This alternatives requires the least amount of new construction either on new ROW or reconstruction of existing ROW of all alternatives providing an improved connection to I-74 at the northern edge of the study area. Although it appears to provide limited potential for improved accessibility, this alternative provides a potentially less disruptive opportunity to improve continuity while making maximum use of the existing highway network of the study area. It also provides a bypass for north-south traffic around the town center of Versailles which may benefit from improved traffic operations.

5.0 Alternatives Analysis

The following section provides the results of the analysis of the three Build alternatives selected for detailed evaluation. This includes analysis of project costs, transportation impacts, environmental impacts, and economic impacts. Included in the discussion of transportation impacts is an assessment of how effectively the alternatives address the identified transportation needs of the SR 101 study area as described in Section 3.0.

5.1 Costs of Construction and Operations and Maintenance

Table 5.1 shows the estimated costs in 1998 dollars for construction and operation and maintenance of each of the Build alternatives. Costs were calculated based on an approximation of the roadway alignment and right-of-way. It should be emphasized that alignment and right-of-way are subject to change as a project moves forward into later stages of engineering and design.

Given the possibility that a Build alternative might be constructed in phases, costs are shown for each alternative for an "A" option representing the segment from the southern end of the study area to U.S. 50 and for a "B" option which includes both the "A" option segment south of U.S. 50 **and** the segment north of U.S. 50 to I-74. For Alternatives 2 and 3, costs are shown for both two-lane and four-lane facilities. Projections of initial traffic volumes and expectations relevant to the rate of traffic growth on the proposed roadways indicate that a two- or three-lane facility should be sufficient to serve expected demand in the near term. However, as discussed in following sections, forecasts of future traffic indicate that development of a four-lane facility along portions of the alternative alignments may eventually be warranted. Therefore consideration should be given to acquisition of right-of-way sufficient for the future expansion to a four-lane facility dependent on future traffic growth.

Table 5.1 Construction and Operating/Maintenance Costs

Alternative	Length (Miles)	Length New Construction (Miles)	Length Reconstruction (Miles)	Length No Construction (Miles)	Construction Costs Pavement (98$)	Construction Costs Bridges (98$)	Right-of-way Costs (98$)	Utility Costs (98$)	Soft Cost (Engineering, Legal, Studies) (98$)	Total Project Capital Costs (98$)	Annual Operating and Maintenance Cost (98$)
Cost by Alternative: Two-Lane Facilities											
2A	21.5	21.5	0.0	0.0	$48,117,000	$2,808,000	$2,084,848	$4,300,000	$8,487,502	$65,797,350	$617,050
2B	38.8	21.5	17.3	0.0	$85,485,000	$3,744,000	$2,084,848	$7,760,000	$14,871,503	$113,945,351	$617,050
3A	16.9	16.9	0.0	0.0	$38,181,000	$1,528,800	$1,638,788	$3,380,000	$6,618,301	$51,346,889	$485,030
3B	35.3	35.3	0.0	0.0	$86,325,000	$4,336,800	$3,423,030	$7,060,000	$15,110,303	$116,255,133	$1,013,110
16A	33.7	5.2	7.5	21.0	$29,109,000	$936,000	$560,000	$2,540,000	$5,007,501	$38,152,501	$149,240
16B	51.0	6.2	7.5	37.3	$31,269,000	$9,336,000	$632,727	$2,740,000	$6,767,501	$50,745,229	$177,940
Cost by Alternative: Divided Four-Lane Facilities (Alternatives 2 and 3)											
2A	21.5	21.5	0.0	0.0	$91,977,000	$5,616,000	$3,127,273	$4,300,000	$16,265,503	$121,285,776	$617,050
2B	38.8	21.5	17.3	0.0	$164,637,000	$7,488,000	$4,804,848	$7,760,000	$28,687,506	$213,377,354	$617,050
3A	16.9	16.9	0.0	0.0	$72,657,000	$4,617,600	$2,458,182	$3,380,000	$12,879,103	$95,991,884	$485,030
3B	35.3	35.3	0.0	0.0	$158,337,000	$10,233,600	$5,134,545	$7,060,000	$28,095,106	$208,860,251	$1,013,110

Table 5.1 Construction and Operating/Maintenance Costs (continued)

Cost Parameters

Rural 4-lane in heavy terrain	$3,500,000	per mile
Widening to 4-lane	$2,500,000	per mile
Rural 2-lane in heavy terrain	$1,800,000	per mile
Diamond interchange	$7,000,000	per interchange
Bridges	$65	per square foot
R/W farm field fence	$65,000	per mile
Agricultural land	$4,000	per acre
Utility Relocation Costs	$200,000	per mile
Contingency factor	20%	
Annual maintenance cost	$3,750	per lane mile
Annual police cost	$13,700	per road mile

ROW Width

2- Lane	200 feet for new construction
	No additional ROW for reconstruction
4-Lane	300 feet for new construction
	200 feet additional for reconstruction

Interchange Requirements: New I-74 Interchange for Alt. 3B and 16B.

Supporting Infrastructure

Bridge Requirements	Span (feet)[1]	Alternative(s)
Log Creek	100	1a/b,2a/b, 3a/b
Log Creek	100	3a/b
Plum Ck.	100	1a/b,2a/b
Upper Indian Ck.	100	1a/b,2a/b
S. Fk. Laughery Ck. Tributary	100	3a/b
S. Fk. Laughery Ck.	190	3a/b
Laughery Ck.	500	1a/b,2a/b,3a/b[2]
Laughery Ck. & Tributary	300	16a/b
Caesar Ck	100	1a/b
Boyds Branch	100	2a/b
S. Hogan Ck.	200	2b, 3b
Allen Branch Hogan Ck.	100	3b
North Hogan Ck.	100	3b
Little Hogan Ck.	100	3b
W. Fk. Tanners Ck.	200	3b
E. Fk. Tanners Ck.	200	3b
Ripley Ck.	100	2b
Ripley Ck.	223	1b
Bobs Ck.	65	1b

Notes:

[1] Width assumed as 40 feet for two-lane facility and 80 feet for four-lane facility.

[2] Alt. 3A and 3B use existing SR 262 Laughery Creek bridge and add second span for Divided Four-Lane Facility.

Cost factors applied in developing these estimates are based on average State of Indiana construction costs for typical rural highways with a 20 percent contingency factor.[1] Right-of-way costs assume the purchase of agricultural land at an average cost of $4,000 per acre. Actual ROW costs can vary substantially depending upon alignment and availability of undeveloped property. In the event that an alignment through undeveloped property is not feasible, additional expenditure may be required. Bridge requirements are indicated in Table 5.1 and are consistent with the assumed alignment of each alternative. Assumptions relevant to the span length of each new bridge are indicated in the table. A 40-foot width is assumed for a two-lane bridge and a 80-foot width for a four-lane bridge. Additionally, a new diamond interchange on I-74 is assumed for Alternatives 3 and 16. Maintenance and operating costs are based on INDOT roadway maintenance and Indiana State Police expenditures for 1998.

Total project costs for two-lane facilities range from approximately $38.2 million for Alternative 16A, involving the construction of a new connection between the intersection of SR 129 and U.S. 50 east of Versailles to SR 129 south of Versailles and reconstruction of a portion of SR 56/156 between Vevay and Markland Dam, to $116.3 million for Alternative 3B which involves the construction of an entirely new roadway between Markland Dam and I-74. The cost of four-lane facilities range from approximately $96.0 million for Alternative 3A, a new roadway from Markland Dam to U.S. 50, to $213.4 million for Alternative 2B, a new roadway between Markland Dam and U.S. 50 and widening of SR 101 north of U.S. 50 to a four-lane facility.

5.2 Transportation Impacts

5.2.1 Traffic Volumes

The transportation impacts of the various SR 101 alternatives were analyzed using the Indiana Statewide Travel Model (ISTM), validated to a base year of 1998 using recent traffic counts conducted within the SR 101 study area. Forecasts were made to the year 2025 using a No Build roadway network which was modified to include all projects (expected and

[1] INDOT prepared construction cost estimates for types of urban and rural roadway improvement projects based on 1997 unit bid prices. These prices were updated to 1998 using construction cost indices.

constructed or E+C) which are expected to be in place in the study area by the 2025 forecast year.

Traffic volumes for the 1998 base year, 2025 No Build, and the three Build alternatives are shown in Table 5.2. The volumes shown are two-way average annual daily traffic (AADT). The table provides AADT for representative roadway segments on major study area roadways. The first part of the table indicates volumes on existing or modified study area roadways. The second part of the table indicates volumes on roadways which would be constructed as new roadways under the proposed alternatives which do not otherwise exist in the 2025 No Build network. It should be noted that in some instances there may be apparent inconsistencies between volumes reported for 1998 and 2025 No Build. This is due to the fact that 1998 volumes are based on actual count data while the forecast year data is generated by the travel demand model and may not exactly correlate at the individual highway link level. The percentage change in traffic volumes on existing roadways is shown in Table 5.3.

In general, it is noted that although each of the three Build alternatives was designed to facilitate north-south movement between I-74 at the northern edge of the study area and the southern edge of the study area along the Ohio River, that higher volumes are carried on the southern portion of the alignments, south of U.S. 50. This is most clearly demonstrated by Alternative 3B which would be constructed as an entirely new roadway from I-74 to Markland Dam. South of U.S. 50, the new alignment is projected to carry approximately 16,000 vehicles daily. North of U.S. 50, volumes range from approximately 8,000 to 13,000 AADT. For Alternative 2B, volumes south of U.S. 50 are in the range of 14,000 AADT, while the northern portion which encompasses the existing SR 101, volumes are approximately 7,200 AADT. Alternative 16B, which follows the alignment of SR 129, demonstrates an exception to this behavior. SR 129 carries approximately 8,000 AADT south of U.S. 50 and as much as 12,900 AADT to the north. It is noted that all three alternatives produce higher volumes on SR 129 north of U.S. 50, although the increase resulting from Alternative 16B, which provides for greater continuity on SR 129, is shown to produce the smallest increase.

Table 5.2 Existing and Projected Traffic Volumes

Route	Segment	AADT 1998	2025 No Build	2025 Alt. 2	2025 Alt. 3	2025 Alt. 16
U.S. 50	U.S. 421 at Versailles to SR 101	9,500	11,010	18,990	12,500	11,240
	SR 101 to Lawrenceburg	11,780	10,880	10,250	10,000	10,790
U.S. 421	SR 56 at Madison to SR 62	9,160	4,970	4,130	4,390	5,400
	SR 62 to U.S. 50 at Versailles	4,930	7,710	6,470	6,410	8,000
	U.S. 50 at Versailles to I-74	4,110	7,530	2,710	2,830	4,440
SR 56	U.S. 421 at Madison to SR 156 at Vevay	1,810	3,150	2,810	2,830	3,320
	SR 156 at Vevay to SR 250 at E. Enterprise	940	970	930	590	980
	SR 250 at E. Enterprise to SR 156	1,370	1,350	2,490	1,550	1,340
	SR 156 to Aurora	5,090	8,260	7,900	6,760	8,010
SR 62	SR 129 to U.S. 50 at Dillsboro (Chief White Eye Trail)	450	770	800	770	640
SR 101	U.S. 42 over Markland Dam to SR 156	1,820	8,540	15,540	15,950	9,780
	U.S. 50 to I-74	4,590	3,850	7,220	2,550	3,850
SR 129	SR 56 to SR 250	940	6,100	570	590	7,560
	SR 250 to SR 62	1,110	6,690	1,180	1,060	8,110
	SR 62 to U.S. 421	1,450	7,180	1,730	1,610	2,360
	U.S. 50 to SR 46	4,850	7,910	15,980	13,910	12,870
SR 156	SR 56 at Vevay to SR 101 at Markland Dam	3,330	8,940	2,950	3,330	10,490
	SR 101 at Markland Dam to SR 250 at Patriot	1,330	1,630	120	130	1,390
	SR 250 at Patriot to SR 56 (Ohio Co.)	1,720	2,690	1,250	1,180	2,450
SR 250	SR 129 to SR 56	1,010	1,180	1,210	1,270	1,170
	SR 56 to SR 156	460	320	320	350	320
SR 262	U.S. 50 to SR 56 at Rising Sun	510	1,090	1,060	950	1,090
U.S. 42 (in KY)	Carrollton to Markland Dam	–	220	2,542	2,230	230
	Markland Dam to KY 35	1,820	1,410	1,600	1,430	1,410
New Segments by Alternative						
Alternative 2B	Markland Dam to SR 250			14,780		
	SR 250 to U.S. 50			13,400		
Alternative 3B	Markland Dam to SR 250				16,010	
	SR 250 to U.S. 50				15,620	
	U.S. 50 to SR 350				12,910	
	SR 350 to I-74				8,000	
Alternative 16B	U.S. 50/SR 129 to SR 129/SR 62					6,840

Table 5.3 Percent Change in 2025 Traffic Volumes: Alternatives 2B, 3B, and 16B

Route	Segment	Percent Change from 2025 No Build		
		2025 Alt. 2	2025 Alt. 3	2025 Alt. 16
U.S. 50	U.S. 421 at Versailles to SR 101	72%	14%	2%
	SR 101 to Lawrenceburg	-6%	-8%	-1%
U.S. 421	SR 56 at Madison to SR 62	-17%	-12%	9%
	SR 62 to U.S. 50 at Versailles	-16%	-17%	4%
	U.S. 50 at Versailles to I-74	-64%	-62%	-41%
SR 56	U.S. 421 at Madison to SR 156 at Vevay	-11%	-10%	5%
	SR 156 at Vevay to SR 250 at E. Enterprise	-4%	-39%	1%
	SR 250 at E. Enterprise to SR 156	84%	15%	-1%
	SR 156 to Aurora	-4%	-18%	-3%
SR 62	SR 129 to U.S. 50 at Dillsboro (Chief White Eye Trail)	4%	0%	-17%
SR 101	U.S. 42 over Markland Dam to SR 156	82%	87%	15%
	U.S. 50 to I-74	88%	-34%	0%
SR 129	SR 56 to SR 250	-91%	-90%	24%
	SR 250 to SR 62	-82%	-84%	21%
	SR 62 to U.S. 421	-76%	-78%	-67%
	U.S. 50 to SR 46	102%	76%	63%
SR 156	SR 56 at Vevay to SR 101 at Markland Dam	-67%	-63%	17%
	SR 101 at Markland Dam to SR 250 at Patriot	-93%	-92%	-15%
	SR 250 at Patriot to SR 56 (Ohio Co.)	-54%	-56%	-9%
SR 250	SR 129 to SR 56	3%	8%	-1%
	SR 56 to SR 156	0%	9%	0%
SR 262	U.S. 50 to SR 56 at Rising Sun	-3%	-13%	0%
U.S. 42 (in KY)	Carrollton to Markland Dam	1055%	914%	5%
	Gallatin Co. Line to KY 35	13%	1%	0%

Both Alternative 2B and 3B result in a substantial increase in traffic on SR 101 over the Markland Dam, while pulling traffic from alternative north-south routes such as U.S. 421, SR 129, and SR 156. Particularly notable is the effect which Alternatives 2B and 3B have on SR 129 south of U.S. 50 which has been recently improved or is programmed to be improved over the entire route between SR 56 and Versailles. As indicated in Table 5.3, these alternatives reduce volumes on this portion of SR 129 by 76 to 91 percent. Alternative 16B, on the other hand, results in a smaller increase in traffic across Markland Dam and a slight increase in traffic on SR 129 south of the new roadway southeast of Versailles.

The analysis shows that volumes on existing roadways can change substantially on limited sections of specific roadway segments depending upon their proximity to new roadways. For example, the 172 percent increase in volume on U.S. 50 between U.S. 421 and SR 101 in Alternative 2B is due in part to movement of traffic from SR 129 north of U.S. 50 to the new alignment south of U.S. 50. It was noted in this case that traffic to this new alignment uses both SR 129 and SR 101 from I-74 and traffic on SR 101 increases by 72 percent despite improvements to the parallel SR 129. On U.S. 50 east of the intersection with the new Alternative 2B, there is a slight decrease in traffic from the No Build volumes. Each of the three Build alternatives result in a slight decrease in traffic on U.S. 50 in the vicinity of Lawrenceburg, a roadway currently experiencing congested conditions projected to worsen in the future. Alternative 3 results in the greatest traffic reduction on this portion of U.S. 50 although this reduction would not substantially improve operations on U.S. 50 in Lawrenceburg.

5.2.2 Vehicle Miles of Travel, Vehicle Hours of Travel, and Select Link Analysis

The Build alternatives were assessed relative to their effect on vehicle miles of travel (VMT) and vehicle hours of travel (VHT). In each case, this provides a measure of overall mobility benefits resulting from the implementation of a given alternative. Using the output of the Indiana Statewide Travel Model and the NET_BC model, discussed in Section 5.4, changes in statewide vehicle miles and vehicle hours of travel were calculated in comparison to 2025 No Build travel characteristics. Results of this analysis are shown in Table 5.4.

Table 5.4 Change in VHT and VMT

Alternative	Change in VHT over No Build	Change in VMT over No Build
2B	-4,920	34,680
3B	-4,429	20,224
16B	-3,587	73,694

Source: NET_BC analysis conducted by Bernardin, Lochmueller Associates.

As shown in Table 5.4, each of the Build results in a reduction in vehicle hours of travel but an increase in vehicle miles of travel. This apparent

contradiction is due to the fact that each of the Build alternatives provides additional capacity and higher speed travel alternatives than are available in the 2025 No Build network. Fundamentally, the travel demand model assumes that trips will seek the shortest travel time path between a trip origin and destination. The new facilities which would be developed under the Build alternatives provide a higher speed alternative to the pre-existing roadways. However, use of these facilities may involve use of a less direct access routing than what might be the shortest possible travel distance. As a result, the travel time for a given trip may be shorter, due to travel on a higher speed facility, but require a longer travel path either on the new facility or to access that facility. Therefore, travel time (VHT) can be reduced although distance traveled (VMT) increases.

As shown in Table 5.4, Alternative 2B produces the greatest decrease in statewide vehicle hours of travel. Alternative 3B is nearly as effective in reducing VHT but produces a significantly smaller increase in VMT. Alternative 16B results in the smallest reduction in VHT and largest increase in VMT.

Analysis of the effect of each alternative on VMT was also conducted at the county level for the SR 101 study area. Results of this analysis are shown in Table 5.5. For each alternative, the overall increase in VMT within the SR 101 study area is significantly larger than the change in VMT to the state as a whole reflecting diversion of traffic to new facilities located within the study area. Traffic attracted to the new facilities which increases VMT within the study area is offset at the statewide level by reductions in traffic which formerly used facilities outside of the study area. Table 5.5 shows that at the county level, the greatest increases in VMT occur in the counties in which new facilities area located. Conversely, all alternatives result in a reduction in VMT through Jefferson County where none of the new facilities would be located.

Given the apparent diversion of traffic from less direct travel paths, a "select link analysis" was conducted on an individual segment of each new highway facility to determine the trip origins and destinations of traffic utilizing these new facilities. A select link analysis uses the travel demand model to determine the origins and destinations of traffic on a specified portion of highway. The select link analysis was conducted for an equivalent link on each of the new alternative facilities directly south of U.S. 50. The findings of this analysis were that only 27 percent of the traffic using the new Alternative 2B alignment have either a trip origin or destination in the SR 101 study area. For Alternative 3B and 16B, the results show only 39 percent and 45 percent of trips, respectively, have a trip origin or destination in the study area. Therefore, the majority of trips using the new facilities are forecasted to be through trips which travel through the study area without stopping for a specific trip purpose within the study area – 73 percent of Alternative 2B, 61 percent for Alternative 3B,

and 55 percent for Alternative 16B.[2] This indicates that there may be added efficiency in the transportation network at the statewide level as a result of each alternative, but proportionately less benefit provided for trips with an origin and/or destination within the SR 101 study area. This has particular implications relevant to the economic benefits which may accrue from the alternatives, discussed further in Section 5.4.

Table 5.5 VMT by County (2025)

County	No Build	Alt 2	Alt 3	Alt 16
Dearborn	1,315,186	1,373,960	1,561,170	1,305,277
Ripley	953,136	1,121,492	910,331	1,009,420
Jefferson	545,023	469,118	469,964	531,242
Switzerland	277,182	281,936	252,072	309,877
Ohio	109,826	114,354	182,600	107,635
Study Area	3,200,353	3,360,860	3,376,137	3,263,451
		Difference		
Dearborn		58,774	245,984	(9,909)
Ripley		168,356	(42,805)	56,284
Jefferson		(75,905)	(75,059)	(13,781)
Switzerland		4,754	(25,110)	32,695
Ohio		4,528	72,774	(2,191)
		-	-	-
Study Area		160,507	175,784	63,098
		Percent Difference		
Dearborn		4%	19%	-1%
Ripley		18%	-4%	6%
Jefferson		-14%	-14%	-3%
Switzerland		2%	-9%	12%
Ohio		4%	66%	-2%
Study Area		5%	5%	2%

Source: Indiana Statewide Travel Model analysis conducted by Cambridge Systematics Inc.

[2] It should be noted that the Indiana Statewide Travel Model does not account for intrazonal trips, that is, trips which have both an origin **and** destination within a single traffic analysis zone. These intrazonal trips are considered to be local trips. Actual roadway operations would include these trips which are not within the capability of the travel demand model to calculate. As a result, the actual percentage of non-through trips reported through the select link analysis is somewhat understated.

5.2.3 Roadway Level of Service (LOS)

In order to assess how roadway level of service (LOS) is affected by the three Build alternatives, the Indiana Statewide Travel Model was used to compare projected AADT on individual roadways with generalized highway capacity criteria for state roads. Roadways are rated on a level of service scale of A through F based on the speed and freedom to maneuver. LOS C or better is considered desirable for rural areas. These LOS criteria, adapted from the Transportation Research Board's Highway Capacity Manual, are shown in Table 5.6 and are used by INDOT for planning-level analysis. It should be stressed that more detailed information, such as peaking characteristics ("K" factors and peak-hour factors), terrain, and truck percentages would be required in order to provide a precise evaluation of LOS for operational and design-level analysis.

The results of this analysis are shown by alternative in Figures 5.1 through 5.4. LOS was assessed assuming that the new facilities would be developed for Alternatives 2B and 3B as two-lane roadways, and for Alternative 16B as a two-lane roadway consistent with the existing configuration of SR 129. Figure 5.1 illustrates AADT traffic volumes and LOS for the 2025 No Build alternative. Based on INDOT's LOS criteria, portions of U.S. 50 and U.S. 421 in the vicinity of Versailles are shown to operate at LOS D or worse, as well as SR 129 south of Batesville, and SR 1, SR 56, and U.S. 50 in the vicinity of Lawrenceburg. The portion of SR 156 between Vevay and Markland Dam is also shown to operate at LOS D. In Figure 5.2, Alternative 2B is shown to divert traffic from U.S. 421 and SR 129 south of Versailles. The Alternative 2B alignment is shown to operate at LOS D or worse based on the increased volume along SR 129 north of U.S. 50 and along the new alignment south of U.S. 50 to Markland Dam. In Figure 5.3, Alternative 3B shows similar conditions along SR 129 north of SR 350, along SR 350 between SR 129 and the new alignment, and along the new alignment from SR 350 south to Markland Dam. Both of these alternatives are shown to improve LOS along U.S. 421 north of Versailles and along SR 156 from Vevay to Markland Dam. Figure 5.4 indicates that Alternative 16B results in increased traffic on SR 129 north of SR 350, resulting in LOS D or worse. Some improvement in LOS is noted along U.S. 421 north of Versailles. Traffic volumes increase and remain at LOS D or worse along SR 156 between Vevay and Markland Dam. None of the alternatives contribute to improved LOS on U.S. 50 in the vicinity of Lawrenceburg.

Figure 5.1 2025 No Build Volume and LOS

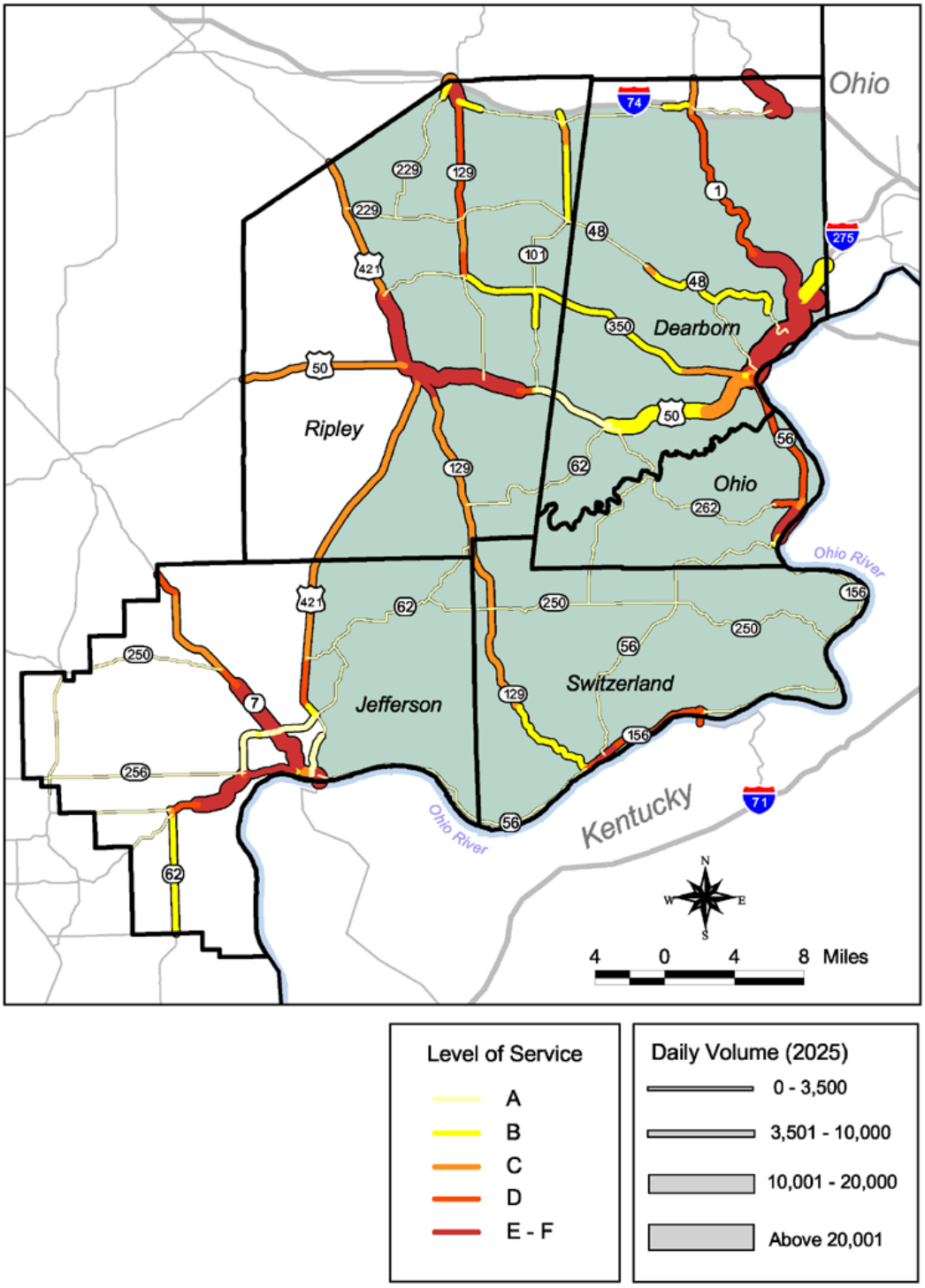


Figure 5.2 2025 Alternative 2 Volume and LOS

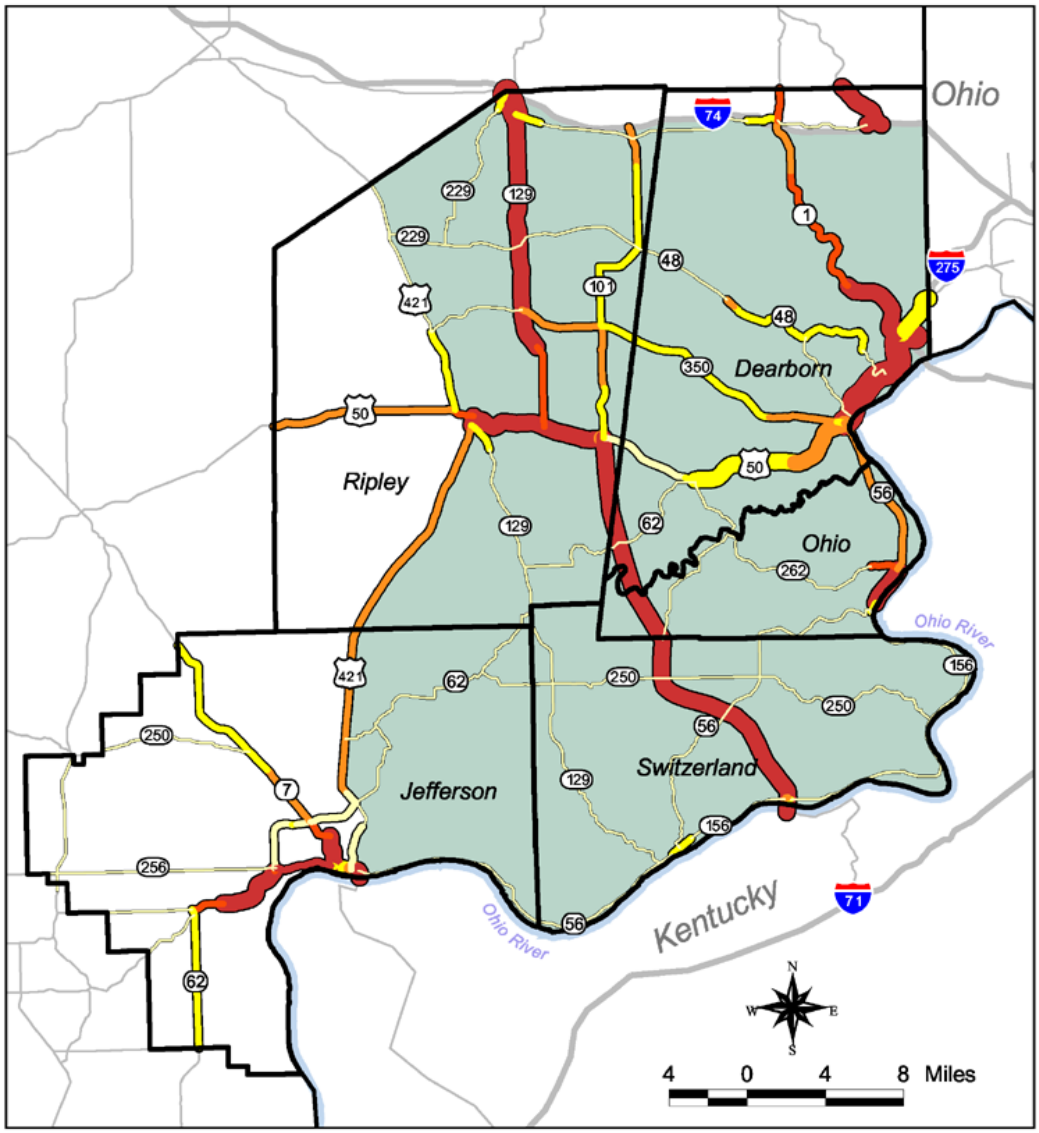


Figure 5.3 2025 Alternative 3 Volume and LOS

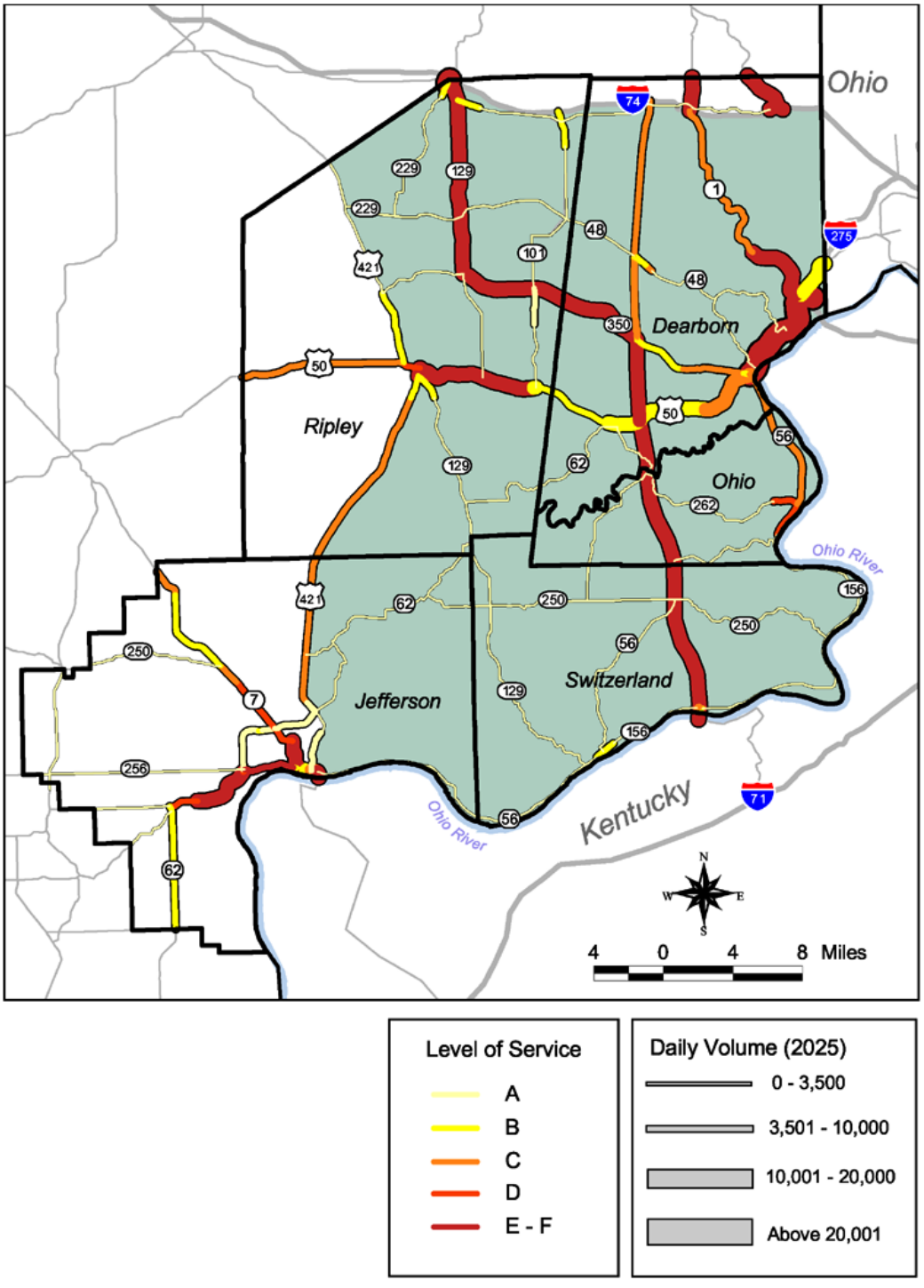


Figure 5.4 2025 Alternative 16 Volume and LOS

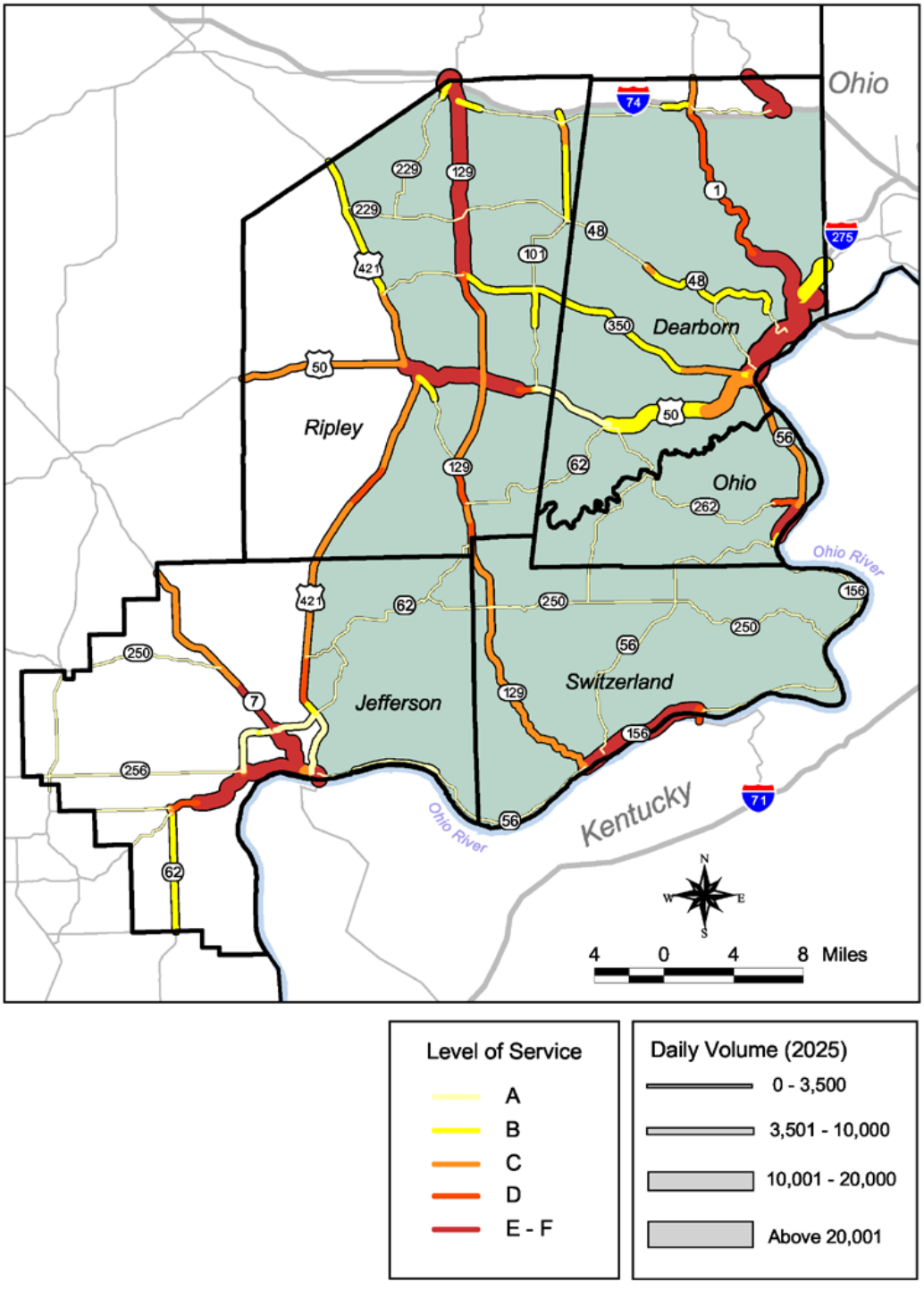


Table 5.6 INDOT Generalized Highway Capacity Criteria[a]

Rural Highways[b]

LOS	Two Lanes	Three Lanes
A	3,600	4,400
B	6,000	7,400
C	8,200	10,200
D	9,800	12,000
E	11,500	14,000

Undivided Multilane[c]

	50 Miles per Hour		55 Miles per Hour	
LOS	Four Lanes	Six Lanes	Four Lanes	Six Lanes
A	8,000	12,000	8,800	13,400
B	13,500	20,200	14,900	22,400
C	18,700	28,100	20,600	31,000
D	22,400	33,500	24,500	38,800
E	26,500	39,800	28,900	43,400

Source: INDOT Generalized Capacity Criteria from Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, D.C., 1994, provided by Bernardin, Lochmueller Associates, Inc.

Notes:

[a] Volumes are two-way Average Annual Daily Traffic (AADT). Criteria shown in tables should be applied for planning purposes only.

[b] Rural Highway Criteria from HCM modified for 15% CMV, 0.7 g/c, and PHF of 0.85.

[c] Undivided Multilane Criteria from HCM, assumes 55/45 directional split and 20 or less driveways/mile.

Based strictly on the forecasts of two-way Average Annual Daily Traffic (AADT), the new roadways proposed under Alternatives 2B and 3B would need to be constructed as four-lane facilities in order to operate at LOS C or better in the 2025 design year. LOS C is INDOT's minimum design standard for new roadways and a design waiver would be required for facilities projected to function at a lower LOS. However, the results of this analysis of LOS must be viewed cautiously and more from a perspective of changes in traffic behavior than criteria for highway design. As discussed above, an accurate evaluation of LOS requires consideration of a number of factors that are not normally addressed in a planning-level analysis. The criteria applied in this analysis are broadly based on daily traffic volumes. An assessment of hourly traffic flows would provide a more accurate indicator of LOS. Also, as indicated in the preceding section, the travel demand model results for the various alternatives indicate a significant diversion of trips from shorter distance routes in order to utilize the

new alternative alignments with higher design speeds. For all three Build alternatives, the majority of these trips are through trips. The travel demand model is sensitive to even slight variations in travel time and assigns all traffic to the shortest travel time route. Actual travel behavior is based on many factors in addition to travel time and may result in a more random trip distribution, producing potentially lower volumes along the alignments of the new alternatives.

5.2.4 Effectiveness in Addressing Study Area Needs

As discussed in Section 3.0 of this report, the two critical transportation needs of the SR 101 study area to be addressed through this study are:

1. Improved Roadway Safety; and

2. Regional accessibility and connectivity

The following sections assess the various Build alternatives in terms of their ability to address these needs.

Safety

The SR 101 Purpose and Need Statement demonstrated that there are areas of rural Southeast Indiana that experience significantly higher crash rates that rural Indiana and the state of Indiana as a whole. Accordingly, the improvement of traffic safety in the SR 101 study area was adopted as a Purpose of the study and the improvement alternatives were developed with reduction in accidents as a primary objective. Major transportation improvements can divert traffic to higher class, safer facilities. As shown in the analysis of existing conditions in the SR 101 study area and the State as a whole, motorists using higher classification facilities experience fewer accidents.

As part of the analysis of alternatives, crash rates were calculated for all state highway facilities in the statewide travel network using the NET_BC module of the Major Corridor Investment Benefit Analysis System (MCIBAS). NET_BC estimates the number of accidents which occur on the statewide travel network based upon national norms for number of accidents by facility type, a facility's functional classification, and average daily traffic as assigned by the travel demand model. As transportation improvements divert traffic onto higher class facilities, the number of accidents are reduced because travel is safer on higher class facilities. Separate crash rates are computed for fatal, injury-only, and property damage only accidents. The forecast is based upon the year 2025 assigned network for each alternative. These forecasts are shown by alternative, vehicle type, and accident type in Table 5.7.

Table 5.7 Annual Number of Accidents by Severity – NET_BC Calculation for Forecast Year 2025 (Statewide Network)

Total Accidents

	Base Case			Alternative 2B			Alternative 3B			Alternative 16B		
Accident Type:	**Auto**	**Truck**	**Total**	**Auto**	**Truck**	**Total**	**Auto**	**Truck**	**Total**	**Auto**	**Truck**	**Total**
Fatal	1,867	287	2,154	1,867	286	2,153	1,867	287	2,154	1,867	287	2,154
Injury	90,124	13,838	103,962	90,022	13,817	103,839	90,054	13,835	103,889	90,116	13,835	103,951
Property Damage	133,168	20,448	153,616	133,036	20,420	153,456	133,076	20,444	153,520	133,181	20,447	153,628
Total	**225,159**	**34,573**	**259,732**	**224,925**	**34,523**	**259,448**	**224,997**	**34,566**	**259,563**	**225,164**	**34,569**	**259,733**

Change in Accidents

	Alternative 2B			Alternative 3B			Alternative 16B		
Accident Type:	**Auto**	**Truck**	**Total**	**Auto**	**Truck**	**Total**	**Auto**	**Truck**	**Total**
Fatal	0	-1	-1	0	0	0	0	0	0
Injury	-102	-21	-123	-70	-3	-73	-8	-3	-11
Property Damage	-132	-28	-160	-92	-4	-96	+13	-1	+12
Total	**-234**	**-50**	**-284**	**-162**	**-7**	**-169**	**+5**	**-4**	**+1**

Source: NET_BC analysis conducted by Bernardin, Lochmueller Associates.

Alternative 16B, which results in little diversion of traffic to higher class facilities, is shown to result in a slight increase in accidents because the improvements result in greater vehicle miles of travel, primarily on existing facilities, without a corresponding shift of VMT to higher class facilities. Both Alternatives 2B and 3B are projected to result in a substantive reduction in accidents, although Alternative 2B, which diverts a higher volume of traffic to higher functional class facilities, is shown to result in the greatest reduction in total accidents. It should be noted that these rates are calculated by NET_BC on a statewide basis and therefore are not limited to the SR 101 study area. More detailed site-specific assessment of potential safety benefits can be conducted as a preferred alternative proceeds through the design process and specific improvements are identified to correct hazardous conditions at locations which experience high crash rates. Improvements which will be considered at the design stage will include increased lane and/or shoulder width, reduction in horizontal curves and grade, addition of passing or left-turn lanes, and improved intersection design. Such improvements and design considerations can be applied to new or improved roadways and as TSM improvements to existing roadways.

Accessibility and Connectivity

In order to assess how well each of the Build alternatives improve overall accessibility to and within the SR 101 study area, two analyses were conducted. The first analysis utilized the Indiana Statewide Travel Model to determine the extent to which the size of population and employment within specified travel times of the study area changes as a result of each alternative. The second analysis examined how optimal travel distances and travel times between key activity centers within the study area change as a result of the Build alternatives.

Travel Time Accessibility

The travel time analysis for population and employment assumed that the five county study area represents a single travel destination for all population and employment from all traffic analysis zones (TAZs) within the statewide travel demand model. This takes into account population and employment outside of Indiana, including Kentucky and Ohio, as well as within the State. The analysis calculated the relative change in the population and employment which is accessible within defined travel times of the study area as a result of the three Build alternatives. Three travel time intervals were assessed based on potentially different travel markets:

1. 45 minutes for population – representing potential commuters to work-places within the study area;

2. 120 minutes for population – representing potential day trips by tourists to the study area; and

3. 180 minutes for employment – representing the potential buyer/supplier market for businesses, assuming the maximum time for a round trip between a buyer and supplier of a hypothetical commodity on a single day.

Results of this analysis are shown in Table 5.8. As indicated by the results of the analysis, the relative benefits of each alternative diminishes as distance (in minutes) from the study area and the location of proposed improvements increases. Alternative 3B is shown to be the most effective in increasing the size of both population and employment accessible within defined travel times to the SR 101 study area. It is nearly twice as effective as Alternative 2B in increasing the size of the potential commuter and buyer/supplier markets to the study area. Alternative 16B is the least effective in increasing the size of population and employment within the defined travel times to the study area.

Table 5.8 SR 101 Accessibility Analysis
(Change in Population and Employment within Defined Travel Times to SR 101 Study Area)

	45 Minutes	120 Minutes	180 Minutes
Alternative	**Labor % Change**	**Tourism % Change**	**Materials % Change**
2B	3.08	2.23	0.78
3B	6.26	2.81	1.62
16B	1.82	1.28	0.38

Key:

45 minutes: Labor/Customer Market (population).

120 minutes: Tourism Market (population).

180 minutes: Buyer/Supplier Market (employment).

Shortest Path Analysis

Consistent with the approach used for the Shortest Path Analysis for the 2025 No Build transportation network discussed in Section 3.0, a shortest

path analysis was used to assess the transportation networks for the three Build alternatives in terms of optimal travel time and travel distance. This analysis compares travel via an "ideal" or straight-line path versus travel on the available highway network between various pairs of key locations within the study area. Markland Dam was considered a significant trip terminus based on its importance as an Ohio River crossing and its connectivity to I-71 in Kentucky. From Markland Dam, travel time and distance was assessed to the nearest interchanges on U.S. 50 (Dillsboro) and I-74 (Saint Leon) as well as to Versailles. The trip between Vevay and Batesville, population centers at the northernmost and southernmost extremes of the study area, was also assessed.

Travel Distance. A straight line was drawn between locations within the SR 101 study area to represent the shortest possible or "ideal" distance between the pairs of key locations. This straight line distance was then compared to the actual highway distance by the shortest available route for the three Build alternative networks. Results of this shortest travel distance analysis are shown in Table 5.9. A linkage index value of 1.0 indicates that a given path is essentially a straight line between the two trip termini, therefore the closer the index is to a value of 1.0, the more direct the shortest available route. As shown in the table, Alternative 3B provides the most direct route between Markland Dam and Dillsboro and between Markland Dam and Saint Leon and a significant improvement in comparison to the No Build alternative. Alternatives 2B and 3B are approximately equal in travel distance between Markland Dam and Versailles, also representing an improvement over the No Build alternative. Alternative 16B provides the shortest travel distance between Vevay and Batesville but provides no improvement over No Build travel distance for any of the location pairs with a terminus at Markland Dam.

Travel Time. Travel time along the straight line representing the shortest possible or "ideal" distance between the two points was calculated assuming an average speed of 60 miles per hour. This straight line travel time was then compared to uncongested travel time by the shortest available route for the three Build alternative networks as calculated by the Indiana Statewide Travel Model. Results of this shortest travel distance analysis are shown in Table 5.9. A linkage index value of 1.0 indicates that a given path is essentially a straight line between the two trip termini, therefore the closer the index is to a value of 1.0, the more direct the shortest available route and the closer the trip is to straight line travel time. As shown in the table, Alternative 3 provides the shortest travel time between Markland Dam and Dillsboro and between Markland Dam and Saint Leon and a significant improvement in comparison to the No Build alternative. Alternatives 2B and 3B are comparable in travel time between Markland Dam and Versailles, also representing an improvement over the No Build alternative. Alternative 16B provides the shortest travel time between

Vevay and Batesville but provides no improvement over No Build travel time for any of the location pairs with a terminus at Markland Dam.

Table 5.9 Shortest Path Analysis

Shortest Path	Markland Dam to Dillsboro (U.S. 50)	Markland Dam to Saint Leon (I-74)	Markland Dam to Versailles	Vevay to Batesville
Distance (in Miles)				
Straightline	17.0	34.2	25.1	39.7
No Build	39.5	53.9	35.7	49.9
Alt. 2B	23.9	48.4	30.1	46.2
Alt. 3B	18.4	38.7	30.7	49.9
Alt. 16B	39.5	53.9	35.7	45.1
Difference (Alt. versus Straightline)				
No Build	22.5	19.8	10.6	10.2
Alt. 2B	6.9	14.2	5.0	6.5
Alt. 3B	1.4	4.6	5.7	10.2
Alt. 16B	22.5	19.8	10.6	5.4
Linkage Index (Actual versus Ideal)				
No Build	0.43	0.63	0.70	0.80
Alt. 2B	0.71	0.71	0.83	0.86
Alt. 3B	0.92	0.88	0.82	0.80
Alt. 16B	0.43	0.63	0.70	0.88
Travel Time (in Minutes)				
Straightline	17.0	34.2	25.1	39.7
No Build	42.4	60.3	36.7	51.2
Alt. 2B	26.8	47.2	30.9	48.3
Alt. 3B	18.9	38.4	32.7	51.5
Alt. 16B	42.4	60.3	36.6	45.9
Difference (Alt. versus Straightline)				
No Build	25.3	26.1	11.6	11.5
Alt. 2B	9.8	13.1	5.8	8.6
Alt. 3B	1.9	4.2	7.6	11.8
Alt. 16B	25.3	26.1	11.5	6.2
Linkage Index (Actual versus Ideal)				
No Build	0.40	0.57	0.68	0.77
Alt. 2B	0.63	0.72	0.81	0.82
Alt. 3B	0.90	0.89	0.77	0.77
Alt. 16B	0.40	0.57	0.69	0.87

5.3 Environmental Impacts

5.3.1 Overview

The SR 101 study area is located within the Dearborn Upland Physiographic Unit, which encompasses the far southeastern corner of the state of Indiana from the Ohio River, north to Richmond, Indiana. The Dearborn Upland encompasses an area where the streams flow southward and eastward emptying into the Ohio River. It is an area with steep stream valleys and rugged topography. The study area is also referred to as the Switzerland Hills Section of the Bluegrass Natural Region. According to the U.S. Fish and Wildlife Service, approximately 47 percent of the Switzerland Hills Section is forested and is considered one of the best remaining natural landscapes in the state of Indiana. The Switzerland Hills Section contains several rare or high-quality community types including; mesic upland forest, dry upland forest, bedrock limestone barrens, and blue-grass till plains flatwoods.

The study area is dissected by Laughery Creek and numerous small headwater streams which are populated by aquatic organisms such as freshwater mussels, crayfishes, amphibians, and freshwater fishes. The study area is within the range of the federally endangered Indiana bat (Myotis sodalis) and running buffalo clover (Trifolium stoloniferum), and federally threatened bald eagle (Haliaeetus leucocephalus). There are current records of Indiana bats in Dearborn and Ripley counties and there is suitable summer habitat for this species throughout the project area. According to the U.S. Fish and Wildlife Service, running buffalo clover is known only from a few locations in Indiana in Dearborn and Ohio counties. Although there is some foraging habitat for bald eagles within the study area, the proposed alignment of the Build alternatives are not likely to negatively impact this species.

Various state and federal agencies were consulted in the development of the proposed alternatives to identify potential environmental impacts, including the Indiana Department of Natural Resources and the U.S. Fish and Wildlife Service. The responses from these agencies can be found in the appendix.

Some of the key points made by these agencies were as follow:

Indiana Department of Natural Resources

- There are Nature Preserves, natural areas, and state listed species in the proposed project areas to which adverse impacts should be avoided. (IDNR identified several Nature Preserves and natural areas

that would potentially be affected by construction of the various Build alternatives. Maps identifying the locations of these areas are included in the Appendix of this report.)

- Because there are fewer high-quality natural areas in southeastern Indiana compared to other similar regions of the state, adverse impacts to these areas would be shortsighted.

- Southeastern Indiana has a high percentage of forest cover and rugged topography as well as many species of amphibians. New terrain roadways in this area would involve significant forest clearing and cut/fill activities resulting in potential forest fragmentation and detrimental impacts to forest interior species of wildlife.

U.S. Department of the Interior – Fish and Wildlife Service

- Based on existing forest as a measure of intact systems in southern Indiana, the proposed project area is one of the best remaining natural landscapes of the state.

- Development of a new highway corridor would affect fish and wildlife resources at both the local and landscape scales.

- Endangered species within the study area include the federally endangered Indiana Bat and running buffalo clover and the federally threatened bald eagle.

5.3.2 Methodology

Environmental impacts were assessed using working alignments depicted on aerial photos for the three Build alternatives. Generally, a 200-foot right-of-way width was used for assessing impacts for the new terrain facilities proposed for Alternatives 2B and 3B. Alternative 16B will utilize the SR 129 improvements which are currently underway between SR 56 near Vevay to a point just north of Olean where a new terrain connector will branch off to the northeast and connect to Ripley CR 400E. Alternative 16B is envisioned as a two-lane facility utilizing existing right-of-way along Ripley CR 400E and SR 129 north of U.S. 50. It was assumed that an additional 30 feet of right-of-way may need to be acquired along either side of these existing roadways for an improved two-lane facility with shoulders. In the area where a new terrain connector is required, a right-of-way width of 120 feet was considered. The actual right-of-way width will vary depending on terrain, stream crossings, and drainage considerations. The numbers shown for relocations are estimates based on a working alignment depicted on aerial photos within each corridor. Wetland information was taken from the National Wetland Inventory Maps of

the project area. This information has not been field checked to verify relocations or wetland conditions. Further detailed environmental analysis will be necessary if this project proceeds.

5.3.3 Impacts by Alternative

Alternative 2B

At their southern ends, Alternatives 2B and 3B both begin with a common new terrain alignment beginning at the Markland Dam/SR 101 crossing at the Ohio River. The alignment then proceeds to the northwest rising out of the Ohio River valley and crossing a heavily forested, hilly area. Alignments 2 and 3 split just south of SR 56 and Alternative 2B continues in a westerly direction across SR 56 toward the Town of Fairview. The alignment curves to the north crossing SR 250 just east of the Town of Fairview and proceeds across the Switzerland and Ohio County line just west of the Town of Bear Branch. Alternative 2B then crosses Laughery Creek (Ohio-Dearborn county line) just east of its confluence with Bear Creek. The National Wetland Inventory Map identified five fairly large tracts of forested wetlands within the corridor between SR 56 and Laughery Creek.

The Laughery Creek area has several natural areas and a state nature preserve identified by the Indiana Department of Natural Resources. Alignment 2B will cross Laughery Creek approximately one mile east of two locations containing a state endangered plant (Viburnum molle – Softleaf arrow-wood) and a state threatened plant (Penstemon canescens – Gray beardtongue). Proceeding north of SR 62, the alignment will pass within 1,500 feet east of Lubbe Woods State Nature Preserve. Lubbe Woods is a 35-acre tract of high-quality upland forest located just south of Boyd Creek.

Alternative 2B proceeds in a northwesterly direction crossing the Ripley-Dearborn county line and intersecting U.S. 50 near SR 101. This area is primarily agricultural and residential with scattered woodlots. North of U.S. 50, Alternative 2B then proceeds on a parallel alignment to the west of SR 101. The alignment crosses SR 350 just west of the Town of Milan and proceeds to the northeast paralleling SR 101 and intersecting I-74 just north of Penntown at the Milepost 156 interchange. The area north of U.S. 50 is mainly agricultural with residences located along SR 101 and forested areas along stream corridors.

Alternative 3B

As previously described, Alternative 3B has a common alignment with 2B at the south end of the study area. The Alternative 3B alignment splits

from Alternative 2B just south of SR 56 and proceeds to the north crossing SR 250 just west of the Town of East Enterprise. The alignment passes just east of the Town of Aberdeen and proceeds north following near the alignments of Cass Union Road and Woods Ridge Road. This area does not appear to be as ecologically sensitive as the area along the Alternative 2B alignment. There are fewer forested wetlands and the alignment is located further from sensitive natural areas that were identified by the Indiana Department of Natural Resources. The alignment will cross a fairly high number of farm ponds and residences in this area. Alternative 3B crosses Laughery Creek just east of the Town of Milton where a small forested wetland is likely to be impacted. North of Laughery Creek, the alignment crosses a heavily forested area and crosses U.S. 50 east of Dillsboro.

North of U.S. 50, Alternative 3B continues northward, crossing SR 350 east of the Town of Mount Sinai. The area north of U.S. 50 is heavily forested with small forested wetlands indicated on the National Wetland Inventory Map at the proposed crossings of South Hogan Creek, North Hogan Creek, and Little Hogan Creek. The Alternative 3 alignment crosses SR 48 just west of the Town of Manchester. The centerline of the working alignment is approximately 3,000 to 5,000 feet east of two natural areas identified by the Indiana Department of Natural Resources along Little Hogan Creek. The alignment continues north of Manchester passing just east of the Towns of Weisburg, Hubbells Corner, and Lawrenceville. Alternative 3B then crosses SR 46 on the east side of Lawrenceville and intersects Interstate 74 where an new interchange would be required. The area north of SR 48 becomes more agricultural with scattered residences and woodlots. The forested areas along the stream corridors are the most ecologically sensitive locations in this area.

Alternative 16B

As previously described, Alternative 16B is a proposed two-lane roadway that utilizes the currently programmed improvements along SR 129 between SR 56 and Versailles. Beginning just north of the Town of Olean, Alternative 16B diverges from SR 129 on a new terrain connector that heads to the northeast crossing Laughery Creek and joining Ripley CR 400E before intersecting with U.S. 50 near the Town of Elrod. The area where the new terrain connector crosses Laughery Creek is heavily forested. After tying into CR 400E, an improved two-lane facility with adequate shoulders would require additional right-of-way along each side of Ripley CR 400E. This would result in the acquisition of frontage property from approximately 21 homes along CR 400E.

North of U.S. 50, Alternative 16B continues along the existing SR 129 roadway all the way to SR 46 east of Batesville. A short new terrain connector would then be required from SR 46 to I-74, with a new interchange

at Interstate 74. Alternative 16B would require the acquisition of frontage property from approximately 19 homes and three businesses along SR 129. The centerline of existing SR 129 is approximately 1,500 feet east of the eastern boundary of Versailles State Park. It is not expected that the acquisition of an additional 30 feet of right-of-way along the west side of SR 129 will negatively impact Versailles State Park. It is more likely that any of the three Build alternatives would improve access to the park.

5.3.4 Summary of Environmental Impacts

Tables 5.10 and 5.11 show a summary and comparison of impacts and land use for each of the three Build alternatives north and south of U.S. 50. Alternative 16B has the fewest overall impacts due to the utilization of previously programmed improvements and existing right-of way for an improved two-lane roadway. South of U.S. 50, comparisons between the proposed new terrain alternatives show that Alternative 2B would potentially impact 48 acres of forested wetlands and approximately 182 acres of forested property. Alternative 2B also comes close to several natural areas. Alternative 3B would impact approximately 108 acres of forest and two acres of forested wetlands. However, Alternative 3B may require more residential relocations and greater impacts to existing lakes and ponds.

North of U.S. 50, Alternative 2B has the greatest impact to agricultural land (approximately 330 acres), and less impact to forested land (approximately 54 acres). Alternative 3B has a nearly equivalent impact to agricultural land (208 acres) and forested land (195 acres). Alternative 3B also will likely require more residential relocations than Alternative 2B.

Table 5.10 Environmental Impact Comparison

Alternative	Segment	Potential Number of Residences Acquired	Number of Emergent Wetlands or Ponds Impacted	Number of Forested Wetlands Impacted	Number of Stream Crossings
2B	South of U.S. 50	37	14	8	9
	North of U.S. 50	29	8	4	6
3B	South of U.S. 50	46	25	3	7
	North of U.S. 50	38	9	4	11
16B	South of U.S. 50	2 + 21 (frontage)	4	1	4 (new)
	North of U.S. 50	1 + 19 (frontage)	3	0	0 (new)

Table 5.11 Land Use of Acreage Acquired

Alternative	Segment	Agricultural Acres	Forested Acres	Forested Wetlands Acres	Residential Acres	Total Acres
2B	South of U.S. 50	254	182	48	37	521
	North of U.S. 50	330	54	6	29	419
3B	South of U.S. 50	254	108	2	46	410
	North of U.S. 50	208	195	5	38	446
16B	South of U.S. 50	25	24	0	12	61
	North of U.S. 50	37	19	0	10	66

■ 5.4 Historic Properties and Places

As discussed in the preceding section on Environmental Impacts, the specific alignment of the proposed SR 101 corridor improvements will be determined following selection of a preferred alternative and development of detailed roadway design. As a result, potential impacts to historic properties, i.e., properties and places on the National Register of Historic Places, cannot be definitively determined at this current stage of analysis. However, based on approximate alignments and corridors, it can be determined whether historic sites are in the vicinity of the proposed alternatives. These locations can therefore be taken into account in designing specific alignments in order to minimize negative impacts to these historic places.

The locations of all National Register listings within the SR 101 study area are shown in the Existing Conditions Report (May 2001). A more detailed inventory indicating properties in the vicinity of the proposed alternatives is shown in Table 5.12, based on the approximate corridors of each of the Build alternatives. This table also indicates properties that are in the vicinity of roadways identified as potentially benefiting from TSM improvements. As indicated above, the extent of impacts, if any, to these properties can only be determined following the determination of a specific alignment and detailed design. Identification of these properties in advance of design can facilitate the avoidance or minimization of impacts.

Table 5.12 Alternatives in Vicinity of Sites on National Register of Historic Places

Site	County	Town	Address	Alternative			
				TSM	2B	3B	16B
John Linsey Rand House	Ripley	Friendship	Jct. Of IN 62 and Maxine Moss Drive				X
Edward Eggleston and George Cary House	Switzerland	Vevay	306 W. Main St.				X
Merit-Tandy Farmstead	Switzerland	Patriot	SR 156	X			
Old Hoosier Theatre	Switzerland	Vevay	Cheapside and Ferry Sts.	X			X
Venoge Farmstead	Switzerland	Vevay	111 SR 129	X			X
Vevay Historic District	Switzerland	Vevay	SR 56 and SR 156	X			X
Thomas T. Wright House (Old Hildreth Home)	Switzerland	Vevay	SR 56	X			X
David Brown House	Ohio	Rising Sun	SR 56	X			
Clore Plow Works (J.W. Whitlock and Co.)	Ohio	Rising Sun	212 S. Walnut St.	X			
Laughery Creek Bridge	Dearborn	Aurora	W. of SR 56	X			
St. John's Lutheran Church and School	Dearborn	Dillsboro	7291 SR 62			X	

5.5 Regional Economic Impacts

This chapter discusses the long-term regional economic impacts of the three Build alternatives proposed as SR 101 corridor improvements. These impacts are presented in the following sequence:

- Direct highway user benefits, including the dollar value of travel time, safety, and operating cost changes; and
- Economic impacts, including:
  - Direct cost impacts on existing businesses in the study area resulting from highway user benefits;
  - Direct impacts on the potential attraction of new businesses to the study area;
  - Direct impacts on tourist activity in the study area; and
  - Regional macroeconomic impacts (multiplier effect) associated with these direct impacts.

The final section of this chapter presents the results of a benefit/cost analysis of each of the proposed highway improvement alternatives.[3]

5.5.1 Direct Highway User Benefits

Overall, improving safety and north-south access, particularly for trucks, would be the most significant benefit to existing business operations of the SR 101 corridor study area. Reduction of congestion in the more developed areas of the corridor, particularly in the vicinity of Lawrenceburg and Madison, also would provide cost savings for businesses. These benefits would be experienced primarily by businesses that own or operate trucking fleets, but also by companies whose workers use area highways for business purposes.

Trucking is the dominant form of goods movement in the corridor. Trucking is critical for local pickup and delivery and interplant movements. It also accounts for a large portion of long-haul movements,

[3] As generally defined, a benefit/cost analysis is a systematic quantitative method of assessing the desirability of public projects or policies when it is important to take a long-range view of future effects.

including drayage to and from major airports, ports, and railyards located outside of the study area.

Travel time savings for trucks represent a real reduction in business operating costs, which are only partially offset by increased vehicle operating costs. The safety costs savings for trucks often do not directly affect business income, but they can affect insurance rates and eventually are absorbed by businesses. These benefits accrue to the for-hire trucking industry, as well as to industries that own and operate private fleets. Trucking companies also would experience these benefits, as would other businesses based elsewhere in Indiana who deliver to the study area.

The portion of auto travel time savings and safety cost savings that is associated with "on-the-clock" work trips represents a change in the productivity of labor (worker's time) and capital (for business-owned automobiles). These are partially offset by the increase in business operating costs.

The User Benefit/Cost Analysis System (NET_BC) is a post-processor program that reads results from the Indiana Statewide Travel Model (ISTM), and then calculates the overall value of travel time, travel cost, and travel safety benefits associated with completion of the major highway project, compared to a base case in which the project is not built. This value may be referred to as either the "user benefit" or the "transportation efficiency benefit."

Users of a highway enjoy both tangible and intangible benefits from the upgrading of a highway or construction of a new highway. Improved roadway design can enhance both convenience and safety for users, and capacity improvements can relieve congestion, making travel times shorter and more predictable. Standard techniques have been developed and refined in recent decades for measuring user benefits. These techniques were employed in this analysis, with two important adjustments:

1. **Disaggregation of User Benefits by Trip Origin –** In traditional benefit/cost analysis, all user benefits are calculated, regardless of the origin and destination of the trip. However, because this analysis evaluates the impact of the highway improvement on the study area only, user benefits were included only for those trips that have an origin or destination in the study area. These trips are the most likely to result in a direct impact on the economy of the study area.

2. **Disaggregation of User Benefits by Vehicle Type –** Traditional analysis has calculated the value of user benefits for automobiles and trucks together, combining the results to provide a total measure of direct benefit. In this analysis, the NET_BC program reports user benefits among three categories of vehicle trips: truck trips, automobile trips for business purposes, and automobile trips for personal or non-busi-

ness purposes. Commuting from home to work is considered to be a personal auto trip. These proportions were used to allocate the total user benefits among businesses and households in the State. The reason for this disaggregation is that user benefits that are related to truck and business auto trips can have a secondary impact on the regional economy because they reduce costs or increase productivity for businesses. The user benefits that are related to personal auto can be valued in dollar terms, but do not generate additional income and therefore do not produce any secondary economic impact.

Business auto and truck travel efficiency benefits will accrue to the existing businesses (i.e., those expected to be present in the No Build condition). The benefits will vary by region depending on each region's share of origins and destinations for highway trips. For example, most trips that benefit from the project will have at least an origin or destination in the study area and therefore will receive a share of the benefit. However, since the origin or destination, and part of the trip, likely occurs outside of the region, some of the benefits will accrue to the rest of Indiana and the U.S. as a whole, but not to the study region specifically.

With these differences in mind, three types of user benefits are quantified in monetary terms (in 2002 dollars) for the study area:

Travel Time Savings. Travel time savings reflect the dollar value of the reduction in vehicle-hours of travel that is associated with the project. Improved travel time is a result of increased speeds that are made possible by reduced congestion in the absence of traffic signals, improved roadway geometry, and the absence of at-grade crossings. In 2025, the travel time savings for highway users under Alternative 3B is estimated to be $2.2 million. Similarly, the travel time savings for highway users under Alternative 2B are $912,000, and $133,000 under Alternative 16B.

Safety Effects. A highway improvement can reduce the number of accidents on a facility by reducing congestion, eliminating dangerous intersections and at-grade crossings, and improving roadway geometry. Benefits can also accrue through diversion of traffic to higher classification facilities, which are designed to higher standards and have lower accident rates per vehicle mile of travel. Highway user benefits associated with the anticipated reduction in accidents attributable to the project were estimated by comparing the probable number and type of accidents that would occur with SR 101 corridor highway improvements to those experienced within the existing system. In 2025, accident costs for highway users are expected to be reduced under Alternatives 2B and 3B by $739,000 and $619,000, respectively. Conversely, the accident cost for highway users under Alternative 16B is expected to increase by $394,000.

Vehicle Operating Cost Changes. Vehicles operating cost changes primarily reflect changes in average operating speed, and include the cost of

fuel, tires, lubricants, maintenance, and depreciation. With the modest increase in average speeds associated with the highway improvement, auto and trucks will be operating at speeds further above the optimal speed for maximizing efficiency and fuel economy than they are now. Consequently, operating costs under cost under Alternative 3B are expected to increase by $1.1 million in 2025. Operating costs are also expected to increase for Alternative 2B ($846,000), and Alternative 16B ($604,000) in 2025.

Summary of User Benefits

The cumulative total of all user benefits for Alternative 2B over the 30-year analysis period is $17.8 million, in 2002 dollars (see Table 5.13).[4] The cumulative total of all user benefits for Alternative 3B over the same analysis period is $37.8 million (see Table 5.14). As shown in Table 5.15, the cumulative total of all user benefits for Alternative 16B over the 30-year analysis period is -$18.3 million. It is important to note the percentage of business auto and truck benefits under each alternative as these benefits are the focus of the subsequent economic analysis.

Table 5.13 Summary of User Benefits from SR 101 Corridor Improvements – Alternative 2B
(Millions of 2002 Dollars, Cumulative 30-Year Change, Trips with an Origin/Destination in Study Area Only)

	Non-Business Auto	Business Auto	Truck	Total
Travel Time Savings	$16.7 M	$1.8 M	$1.7 M	$20.2 M
Accident Cost Effect	$11.5 M	$3.4 M	$1.4 M	$16.3 M
Vehicle Operating Cost Changes	-$13.8 M	-$0.9 M	-$4.0 M	-$18.7 M
Total	**$14.4 M**	**$4.3 M**	**-$0.9 M**	**$17.8 M**

Source: Bernardin, Lochmueller & Associates, Inc.

[4] As detailed in benefit/cost section of this report, a 30-year analysis period is used for this project (2003-2032). Therefore, the cumulative direct highway user benefits reported here represent benefits that begin to accrue in 2010 (estimated completion of project) through 2032 (the end of the benefit/cost analysis period).

Table 5.14 Summary of User Benefits from SR 101 Corridor Improvements – Alternative 3B
(Millions of 2002 Dollars, Cumulative 30-Year Change, Trips with an Origin/Destination in Study Area Only)

	Non-Business Auto	Business Auto	Truck	Total
Travel Time Savings	$39.3 M	$3.7 M	$6.0 M	$49.0 M
Accident Cost Effect	$9.4 M	$3.5 M	$0.9 M	$13.8 M
Vehicle Operating Cost Changes	-$28.3 M	-$1.6 M	$4.9 M	-$25.0 M
Total	**$20.4 M**	**$5.6 M**	**$11.8 M**	**$37.8 M**

Source: Bernardin, Lochmueller & Associates, Inc.

Table 5.15 Summary of User Benefits from SR 101 Corridor Improvements – Alternative 16B
(Millions of 2002 Dollars, Cumulative 30-Year Change, Trips with an Origin/Destination in Study Area Only)

	Non-Business Auto	Business Auto	Truck	Total
Travel Time Savings	$2.2 M	$0.5 M	$0.3 M	$3.0 M
Accident Cost Effect	-$5.6 M	-$2.1 M	-$0.9 M	-$8.6 M
Vehicle Operating Cost Changes	-$26.5 M	-$1.8 M	$15.6 M	-$12.7 M
Total	**-$29.9 M**	**-$3.4 M**	**$15.0 M**	**-$18.3 M**

Source: Bernardin, Lochmueller & Associates, Inc.

As indicated in these tables, each of the SR 101 corridor improvement alternatives, operating costs are expected to *increase* for highway users. Each alternative reduces vehicle hours of travel (autos and trucks can drive faster and reach destinations quicker). However, because each of these alternatives offers a safer and faster travel alternative than existing routes, highway users are likely to increase the length of their trip (increased vehicle miles of travel) by diverting from what might be a more

direct (or shorter distance) route to these safer and faster roadways. Therefore, operating costs are expected to increase along with increased vehicle miles of travel as autos and trucks use more fuel, experience increased vehicle wear and tear, and require additional maintenance.

Personal auto trips account for a sizeable portion of the user benefits, and they are included in the overall benefit/cost analysis. However, because these benefits have no multiplier effects, they are not considered in the further steps of the economic analysis.

5.5.2 Economic Impacts

Direct Impact on Existing Businesses. Business auto and truck travel efficiency and cost savings impacts by industry are used as direct impacts for entry into the Regional Economic Models, Inc. (REMI) dynamic simulation model to estimate macroeconomic impacts for the region. These business expansion impacts are the result of reduced direct user travel costs for existing trips. Unlike most static input-output models, the REMI model provides a way to reflect industry cost reductions and these impacts increase the competitiveness of a region's economy over time, leading to greater economic output, employment, and income. Standard input-output models only allow for the analysis of a one-time spending or employment impact, unlike REMI which examines impacts over time, including changing industry productivity, production costs, and prices.

Induced Business Attraction. In addition to reducing costs for existing businesses, an intercity highway improvement often may improve access to strategic markets and make its corridor more attractive as a place to do business. This attractiveness may result in the formation of new business in the study region, the relocation of outside business to the region, or the decision to expand activity at an existing local business rather than at a competing outside location. These impacts are over and above the "Business Expansion Impacts," which reflect the effects of *reducing direct user travel costs* for existing trips.

Highway investments are only one factor in the complex nexus of business location decisions, but it is possible to make broad estimates about the types and sizes of businesses that may be attracted to a region as a result of a major highway project. Depending on the relative attractiveness of the region compared to surrounding regions, the highway investment could facilitate a net migration of business into the region.

Table 5.16 displays the results (estimated increased in employment) of the business attraction analysis in 2025.[5] Based on studies of business attraction impacts of highway projects in other states, it is assumed that the full net increase in employment by region will be phased in over a period of 15 years. The induced business attraction impact of Alternative 3B is estimated to be 257 jobs in 2025. Similarly, Alternative 2B and Alternative 16B are expected to attract 137 and 91 jobs in 2025, respectively.

Table 5.16 Induced Business Attraction Impact, 2025

(In Number of Jobs)

	Alternative 2B	Alternative 3B	Alternative 16B
Durable Goods	50	100	30
Non-Durable Goods	22	43	13
Mining	0	0	0
Construction	0	0	0
Transportation and Public Utilities	4	9	3
Finance, Insurance, Real Estate	1	2	1
Retail Trade	39	66	31
Wholesale Trade	9	17	5
Services	13	21	9
Agricultural Services	0	0	0
Total	**137**	**257**	**91**

Source: Economic Development Research Group. Analysis by Cambridge Systematics, Inc.

A conceptual note about business attraction is that while it typically represents an economic development benefit for the region where the transportation improvement occurs (mainly southeast Indiana), it likely reflects a change in the distribution of economic activity rather than generation of new economic activity (at the state level). SR 101 improvements reflect an efficiency gain for the region, but also a regional competitiveness boost that inherently helps the southeast Indiana study area relative to the rest of

[5] The business attraction analysis was conducted with the ARC Handbook Spreadsheet (Economic Development Opportunities) Model © 2000, Economic Development Research Group, Inc.

the State and its adjacent neighbors. This aspect, largely experienced through business attraction, is primarily a gain for southeast Indiana but may represent a reduction of future economic growth for the rest of the State and adjacent neighbors as there is a limited national pool of resources, in particular, labor. This implies some reallocation of future growth from other areas towards southeast Indiana.[6]

Tourism Impact. A highway improvement also has the potential to enhance tourist activity in the study area, by both increasing access from major origin markets and supporting the development of new segments of the tourist industry. Tourism is a form of business attraction, in that it is affected by market access and market area expansion. However, it is examined separately because tourism activities do not fit within the standard industrial classification system, and because tourism development requires that the customer travel to the destination area rather than having a business ship its product.

Tourism is defined as the set of business activities associated with serving visitors. It includes visitor destinations such as parks, museums, and other attractions, and an array of supporting businesses that provide products and services to visitors. These include hotels and lodging places, retail establishments, and restaurants. In terms of tourism impact, the casino industry in southeast Indiana will be a primary beneficiary of SR 101 corridor improvements.

The direct impacts on tourism are measured in terms of visitors and dollars of business sales, which ultimately affect jobs and income. It is important to note that an increase in tourism in the study area would be partially offset by a decrease in tourist activity in the rest of the State, as some trips shift from other locations to the corridor.[7] Under Alternative 3B, tourism activity in the region is estimated to increase by 150,000 visitors on an annual basis. Similarly, Alternative 2B may increase annual tourist activity in the study region by 135,000 visitors, where as

[6] Employment in the rest of Indiana was offset by the percentage of truck trips (about 30 percent for each alternative) expected to use the SR 101 corridor (origin or destination in the study area). This is a conservative proxy for estimating the relationship between economic activity in the study area and the rest of the state, and accounting for job relocation within Indiana.

[7] For this analysis, it was assumed that 50 percent of the increased annual tourist activity in the study would be drawn from the rest of Indiana. Therefore, an offset in annual tourist activity was applied to the rest of Indiana in the REMI economic simulation model.

Alternative 16B is estimated to increase annual tourist activity in the study region by 15,000 visitors.[8]

Regional Macroeconomic Impacts. As briefly described in the direct impacts section, direct impacts are translated into inputs for the REMI economic simulation model to estimate total regional economic impacts. The impacts are measured at two geographic levels, including southeast Indiana and the rest of Indiana. The REMI model performs four key functions for the regional economic analysis:

1. It estimates the macroeconomic effects (employment, income, etc.) of travel efficiency benefits that are measured by travel time and accident cost savings, and changes in operating costs;

2. It estimates total economic impacts, i.e., multiplier effects from additional business, tourism and consumer spending, due to the direct changes caused by SR 101 improvements;

3. It estimates impacts over time in a dynamic fashion as changes to the economy affect prices, wages, and other competitiveness factors; and

4. Along with the regional definition of direct impacts, it estimates economic impacts for specific geographic jurisdictions, such as counties or states.

The REMI economic simulation model estimates the total economic impacts from the direct impacts produced by SR 101 improvements including business expansion, business attraction, tourist activity, and their associated multiplier effect. Input variables to the model are chosen to represent the direct impacts of an anticipated change in the economy, such as an expansion of highway, rail, or airport service. The REMI model then estimates the indirect and induced impacts throughout all sectors of the regional economy based on these direct impacts. For example, the model would capture key interrelationships within the economy such as the increase in competitiveness and production (sales) due to reduced transportation costs in the economy.

The model is calibrated by REMI using data specific to counties in the SR 101 study region. For each alternative, the REMI simulation model is run to develop a forecast of the economy with SR 101 corridor improvements. Results of the alternative forecasts are then compared to baseline ("no action") economic forecasts for the region to estimate project impacts.

[8] Estimates of increased tourist activity were developed using market research from a large casino located in the study area, and through the expert opinion of Cambridge Systematics, Inc. travel demand/market research analysts.

More detailed documentation of the REMI model is available in the REMI documentation manuals.[9]

Employment in the southeast Indiana study region is expected to increase by 301 jobs, and personal income is anticipated to increase by $12.1 million in 2025 under Alternative 2B (see Table 5.17). Similarly, employment in southeast Indiana is expected to increase by 538 jobs and personal income is anticipated to increase by $22.7 million under Alternative 3B. Finally, employment in is expected to increase by 170 jobs and personal income is projected to increase by $7.2 million under Alternative 16B. It is important to note that the benefits shown in Table 5.17 represent the *total economic impacts* for each of the project alternatives, and *should not* be added to other benefits shown in this chapter. These benefits represent the difference from the REMI model control forecast for the study area economy. For example, Alternative 3B (in 2025) is estimated to create an additional 538 jobs for the study area that were not expected to be present under the REMI control forecast.

Table 5.17 Results of the REMI Regional Economic Impact Analysis for Southeast Indiana, in 2025

(Difference from Control Forecast in 2002 Dollars)

	Alternative 2B	Alternative 3B	Alternative 16B
Employment	301	538	170
Personal Income	$12.1 M	$22.7 M	$7.2 M

Source: Cambridge Systematics, Inc from the REMI Model, Inc.

[9] Regional Economic Models, Inc. *REMI Policy Insight Users Guide, Version 3.1.*

6.0 Evaluation and Next Steps

The preceding section of this report presents the analysis of alternatives based on a variety of criteria illustrating the primary characteristics of each alternative and their effectiveness in addressing the needs of the SR 101 study area. In this section, the key attributes of each alternative are summarized in order to compare their effectiveness and to identify the alternative (or alternatives) which appears to be most feasible to proceed into the next phases of project development.

6.1 Summary Evaluation

Table 6.1 presents a summary evaluation of each of the three Build alternatives based on various criteria identified in the early stages as representative of study area needs. The Key Factors shown in the table address the transportation needs of the study area identified in the development of the study's Purpose and Need Statement. Secondary Factors shown in the table address additional quantitative criteria which provide further information to be considered in determining which alternative or alternatives provide the greatest benefits for the SR 101 study area and the state of Indiana overall. The factors shown in **bold type** in the table indicate which alternative rated the highest or most beneficial for that particular criterion.

6.1.1 Key Factors

Safety (Section 5.2.4)[1]

Table 6.1 shows a summary of predicted total accident reductions for each alternative. The figure shown is a composite total all accidents reduced (fatal, injury, and property damage) for both autos and trucks as predicted by the NET_BC model. Alternative 2B is shown to be the most effective in reducing accidents for the forecast year (2025), largely as a result of

[1] Detailed discussion of the basis for the various factors can be found in Section 5.0 of this report, as indicated parenthetically for each factor.

diversion of traffic to higher classification roadways with lower average accident rates per mile of travel.

Table 6.1 Summary Evaluation of Alternatives

	Alternative 2B	Alternative 3B	Alternative 16B
Key Factors			
Safety			
Annual Accidents Reduced	**284**	169	-1
Accessibility			
Percent increase in population within 45 minutes	3.08%	**6.26%**	1.82%
Percent increase in population within 120 minutes	2.23%	**2.81%**	1.28%
Percent increase in jobs within 180 minutes	0.78%	**1.62%**	0.38%
Average linkage index – distance	0.78	**0.85**	0.66
Average linkage index – travel time	0.75	**0.83**	0.63
Secondary Factors			
Mobility			
Change in VMT	+34,680	**+20,224**	+73,694
Change in VHT	**-4,920**	-4,429	-3,587
Environmental			
Potential residential acquisitions	66	84	**43**
Wetlands impacted	34	41	**8**
Acreage acquired	940	856	**127**
Economic			
User benefits (in millions of dollars)	$17.8	**$37.8**	-$18.3
Change in employment	301	**538**	170
Change in personal income (in millions of dollars)	$12.1	**$22.7**	$7.2

Accessibility (Section 5.2.4)

Table 6.1 summarizes the potential accessibility benefits of each alternative based on the extent to which each alternative increases the size of population and employment within defined travel times of the study area and also the extent to which each alternative improves the efficiency of connections between key study area locations, based on distance and travel time. Alternative 3B is shown to provide the greatest benefits relative to improved accessibility. Alternative 3B is the most effective in increasing the size of population and jobs within defined travel times of the study area. A linkage index of 1.0 is equivalent to a straightline trip between key

locations within the study area. The closer the value of the indices are to 1.0 for distance and travel time, the shorter and straighter the travel path. Alternative 3B was found to provide a more efficient connection between key locations within the study area.

6.1.2 Secondary Factors

Mobility (Section 5.2.2)

Two important indicators of how well a transportation improvement benefits mobility is the effect it has on vehicle miles of travel and vehicle hours of travel. As discussed in Section 5.0, all three Build alternatives result in diversion of traffic from lower speed but more direct roadways to the new alternative alignments. While these alignments have higher design speeds than competing routes, their use may result in a more indirect trip and longer travel distances. This occurs even though the new alternatives may provide more direct routes for travel **within** the SR 101 study area, because a majority of trips utilizing the new alignments of all three Build alternatives are through trips with no origin or destination within the study area. As indicated, all three alternatives produce some increase in statewide VMT, although Alternative 3B produces the least increase. All three alternatives produce a decrease in VHT, the largest decrease being produced by Alternative 2B.

Environmental (Section 5.3)

Table 6.1 summarizes a number of the environmental criteria discussed in Section 5.0. Given that Alternative 16B primarily follows the existing SR 129 right-of-way and involves a limited amount of new construction to provide greater continuity between segments of SR 129 north and south of U.S. 50, the environmental impacts of Alternative 16B are the smallest of the three alternatives. These impacts are noted in terms of potential residential property acquisitions, wetlands impacted, and acreage acquired.

Economic (Section 5.5)

From an economic perspective, user benefits accounts for the value of travel time, travel cost, and travel safety. Travel time benefits are a function of reduced vehicle hours of travel which result from higher vehicle speeds and reduced travel delay. Travel cost benefits are a function of the cost of fuel, tires, lubricants, maintenance, and depreciation resulting from reduced travel time and vehicle miles of operation. Travel safety benefits result from reduced vehicle miles of operations and diversion of traffic from lower classification to higher classification facilities with lower accident rates per mile of travel. The analysis of user benefits, discussed in

Section 5.4, found that Alternative 3B produced the highest user benefits of the three Build alternatives.

Benefits to users of the transportation system can directly benefit businesses in the study area by reducing the cost of existing business-related trips. As intercity transportation conditions improve, highway improvements can improve access to strategic markets and make an area more attractive as a place to do business, resulting in increased sales and productivity. Improved accessibility can also enhance an area's ability to attract tourism, a particular consideration in the SR 101 study area. This combination of factors can translate into increased employment and personal income. As predicted through the application of the REMI model discussed in Section 5.4, Alternative 3B is the most effective alternative for increasing employment and personal income in the SR 101 study area.

■ 6.2 Recommendations and Next Steps

Based on the evaluation of the three Build alternatives, specifically with respect to the key evaluation factors corresponding to the identified needs of the SR 101 study area, Alternative 2B rates highest in terms of Safety and Alternative 3B rates highest in terms of Accessibility. With respect to the secondary factors, all alternatives result in increased vehicle miles of travel (VMT) and reduced vehicle hours of travel (VHT). Alternative 2B is most effective in reducing VHT. However, Alternative 3B produces the greatest benefits relevant to all Economic criteria. Alternative 16B results in the least environmental impacts relevant to the various Environmental criteria.

Despite its lowest environmental impacts, Alternative 16B produces virtually no change in the rate of accidents and little benefits relevant to improved accessibility – both primary needs of the study area. It also produces the least economic benefits for the study area. As a result, it is recommended that this alternative be removed from further consideration. Both Alternative 2B and 3B are found to produce tangible benefits with respect to accessibility and safety although Alternative 3B provides both of these benefits plus significant economic benefits for the study area. In terms of construction costs, Alternatives 2B and 3B are approximately equivalent, although the cost of constructing only the southern segments of Alternative 3B between Markland Dam and U.S. 50 is about 25 percent less than the cost of Alternative 2B. This is particularly relevant in consideration of how the construction of a project could be phased, as discussed below. Therefore it is recommended that Alternative 3B be retained for further consideration and analysis, with particular attention directed to

ways of phasing the alternatives to serve areas of greatest need and of designing the improvements to maximize their cost-effectiveness.

The design of the improvements encompassed by Alternative 3B should take the following factors into account:

- As shown in Section 5.2, projections of AADT traffic volumes on the new roadway indicate potential for substandard level-of-service operations if the new roadway is constructed as a two-lane facility. However, given existing traffic and development trends in the study area, it appears that construction of four-lane facility would be excessive. As also discussed, more than half of the projected traffic using the new facility is through-traffic which is diverted from alternate and, in some cases, more direct travel routes due to comparatively higher design speeds on the proposed new roadways. At least a portion of this through-traffic is likely to not make this diversion. Based on these forecasts, it appears that a design waiver should be considered by INDOT to allow construction of a two-lane facility while acquiring adequate right-of-way to allow for future widening if eventual growth in demand warrants.

- During the design stage of project development, the physical layout of the facility would be more accurately determined, addressing the need and appropriate locations of turning and climbing lanes to enhance safe operations and roadway capacity. It is anticipated that a three-lane cross-section will be needed in some portions of the new roadway.

- Analysis of truck movements in the study area indicates that a new roadway to Markland Dam, connecting with the new road between U.S. 42 and I-71 in Kentucky, would attract substantial truck traffic from alternate routes such as U.S. 421, SR 129, and SR 56. By removing trucks from alternate and potentially less safe routes, there are significant safety benefits for the study area. This also provides economic benefits as a result of reduced travel time and shipping costs for shippers and freight handlers. However, for study area residents in the vicinity of new or improved roadways or adjacent roadways which may experience increased truck volumes, there could be legitimate cause for concern if increased truck traffic leads to localized congestion, noise, and safety issues. In designing new facilities, it will be important to assess these localized impacts, identify opportunities for mitigation including possible bypass routes where warranted, and assure affected residents that roadways will be designed to provide safe and efficient traffic operations.

Project Phasing and Next Steps

Given the cost of constructing Alternative 3B in its entirety between Markland Dam and I-74, particularly during this period of constrained state and federal budgets, it is recommended that the project proceed in phases, initially addressing highest priority improvements and completing the project as need and financial capability may warrant. These implementation phases would consist of the following:

- **Phase 1:** Identification of specific locations of high accident frequency and/or severity in Switzerland and Ohio Counties and application of low-cost TSM-type safety improvements. Such improvements can be expedited and applied on an as-needed basis to address the highest priority locations in advance of any substantial new highway development project. Priority roadways should be SR 56 and SR 156 as described in Section 4.1 ("Alternative 4"). Improvements to SR 129 in Switzerland County are programmed for construction in 2003.

- **Phase 2:** Design and construct the southern portion of Alternative 3B (described as "Alternative 3A" in Section 4.0) between Markland Dam and U.S. 50. Travel demand forecasts of this roadway (without the extension between U.S. 50 and I-74 to the north) show AADT on this roadway in 2025 nearly equivalent to the volume which would be carried with the fully constructed roadway alternative to I-74. In the absence of the connection to I-74, traffic to the new roadway south of U.S. 50 is carried by SR 129 from the northwest and U.S. 50 from the northeast. However, added traffic on U.S. 50 in the vicinity of Lawrence, which currently experiences congested operations, may be problematic in the absence of capacity improvements in this area. Concurrent with the construction of the southern portion of the alignment, the right-of-way for the northern portion from U.S. 50 to I-74 should be delineated with efforts undertaken to preserve the right-of-way for future development.

- **Phase 3:** Completion of the northern portion of Alternative 3B from U.S. 50 to I-74.

Implementation of each phase will require appropriate programming and funding. In order to move these improvements forward, it is recommended that TSM-type safety improvements be programmed in the State Transportation Improvement Program (STIP) in the next update cycle, with identification of approximate funding amounts and funding sources. TSM-type safety improvements can be funded in large part using federal Surface Transportation Program (STP) funds. It is also recommended that the next update of the Statewide Long-Range Transportation Plan identify the development of a new roadway between Markland Dam and U.S. 50 as a planned improvement to the regional highway system. Inclusion of the

planned improvement in the Statewide Long-Range Transportation Plan is the first step in the implementation process and is a necessary step toward the programming of the project in the STIP.

An important consideration in the programming and construction of new roadway facilities is Indiana's statutory limitation on the number of highway miles which can be maintained as state highway. By law, this ceiling on state highway mileage cannot be exceeded and construction of new state highway can necessitate the relinquishment of existing state highway to county or municipal authorities. This entails a negotiated agreement between INDOT and the local authorities, taking into account the benefits provided by new facilities and potential redundancy with pre-existing roadways. Depending on final design, implementation of Alternative 3B could compel relinquishment of portions of state roadways parallel to the new alignment in the following counties:

- Switzerland County;
- Ohio County; and
- Dearborn County.

Funding of a new roadway to the extent recommended will present a challenge to INDOT, given current funding conditions and competition among numerous projects for limited resources. Identification of innovative funding sources apart from traditional state and federal funding could enhance the feasibility of project implementation. One source which should be considered are potential contributions from the casinos now operating along the Ohio River within the SR 101 study area. The Belterra Casino and Resort near Markland Dam would directly benefit through improved access from the Indianapolis and Cincinnati markets. Both the Grand Victoria in Rising Sun and the Argosy in Lawrenceburg could also benefit, although to a lesser extent. As a result, casino owners may be willing to contribute project development funds to facilitate eventual development of a new north-south roadway.